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THE MODERN TREATMENT OF DIABETES MELLITUS.[1]

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BEFORE discussing the treatment of *diabetes mellitus* it would be advisable perhaps, first, to remind you very briefly of the more important faults in metabolism which occur in this disease; secondly, to discuss shortly its diagnosis; and, thirdly, to allude briefly to some aspects in the ætiology of the disease which have a bearing on its control and treatment.

Metabolism in Diabetes.

Diabetes mellitus is a disease in which profound disturbances of metabolism occur, due in the majority of cases to a degeneration of the β cells of the islets of Langerhans in the pancreas and a consequent failure in the secretion of insulin. In some cases it may be due to a dysfunction of some other gland or, as will be shown later, to an impairment of the organism's sensitivity to insulin.

The carbohydrate of a diet is absorbed into the blood stream as sugar, and a proper supply of insulin is necessary for the conversion of this sugar into glycogen, its storage in the liver and tissues as such, and for its utilization by the tissues as a source of energy. So that in diabetes, where the supply of insulin is diminished, the liver and tissues are deprived to a great extent of this power of storing and utilizing sugar, with the result that the percentage of sugar in the blood rises above normal limits and sugar, being a threshold substance, is excreted in the urine.

As you know, the fasting blood sugar is normally between 80 and 120 milligrammes per 100 cubic

[1] Read at a meeting of the South Australian Branch of the British Medical Association on November 29, 1934.

centimetres, but in diabetes it may rise to 300 to 500 or even 1,000 milligrammes in a severe case.

The kidney threshold for sugar is about 180 grammes per 100 cubic centimetres, so that as soon as the blood sugar rises above 0·18% sugar appears in the urine and may appear in very considerable quantities in severe cases. The osmotic pressure exerted by this concentration of sugar in the urine prevents the normal reabsorption of water in the tubules of the kidneys and so gives rise to a polyuria.

The combustion of fats can be complete only if sugar is being burnt in adequate quantities at the same time and so, when the sugar supplies are inadequate, as in starvation, or when the sugar is not properly utilized, as in diabetes, the combustion of fats is arrested to a considerable extent at the four-carbon group, that is, β oxy-butyric and aceto-acetic acids; and in severe cases, as the excretory mechanisms of the body are unable to keep pace with the production of these acids, they, together with cholesterol, accumulate in the blood. The glycerine fraction of fat (about 10%) is converted into glucose during metabolism.

With regard to the protein, it is known that a fraction (58%) is turned into glucose and the remainder into fatty acids during metabolism, so that the metabolic faults in diabetes affect the protein in the same way as the carbohydrate and fat.

From what I have said it can be seen that 90% of the fat of a diet and 46% of the protein are capable of producing β oxy-butyric and aceto-acetic acids (or, as they are usually called, ketones) during metabolism, and this fraction of the diet is known as the ketogenic fraction. On the other hand, that part of the diet which is turned into glucose during metabolism, namely, all the carbohydrates and 58% of the protein and 10% of the fat, is known as the antiketogenic fraction, because, under normal conditions, it is capable of completing the metabolism of the poisonous ketone bodies.

The accumulation of sugar and ketones in the blood in severe cases of diabetes gives rise to a group of symptoms which are characteristic of the disease.

In an effort to rectify the state of hyperglycæmia and ketosis which exists, the kidneys secrete large quantities of acid urine containing a high percentage of sugar, and also of β oxy-butyric and aceto-acetic acid; thus a considerable part of the food ingested is excreted by the kidneys without being utilized.

This process causes considerable dehydration and wasting and gives rise, in a patient suffering from severe diabetes, to an insatiable thirst and a voracious appetite. This puts a further strain on the already overtaxed pancreas, setting up a vicious circle, the patient becoming more and more emaciated and dehydrated; and, despite the combined efforts of the various mechanisms of the body for keeping the hydrogen ion concentration of the blood at its normal level, the alkali reserve is gradually depleted and a condition of severe acidosis occurs, the patient passing into a state of coma, in which he dies.

Diagnosis.

There is no difficulty in the diagnosis of these acute and severe cases, but there are many cases of mild diabetes, particularly in middle-aged and elderly people, whose only symptoms are perhaps a pruritus of the thighs and genitals, a neuritis, an arterial degeneration or a failure in vision, due to commencing cataract or retinitis. Such cases are usually detected in the course of a routine examination by the discovery of a glycosuria.

Glycosuria, however, does not necessarily mean diabetes, and nowadays a diagnosis can be made by an estimation of the percentage of the fasting blood sugar and by giving the patient 50 grammes of glucose while he is fasting, and estimating the blood sugar every half hour for two hours afterwards.

In the normal individual the fasting blood sugar varies between 0·08% and 0·12%, and after the ingestion of 50 grammes of glucose it rises to about 0·16% in the first half hour and then falls fairly rapidly until, by the end of the second hour, it has come back approximately to the fasting level again.

As the kidney threshold for sugar is 0·18%, the normal person does not secrete sugar in the urine after a test of this sort. The responses to a glucose tolerance test in the abnormal individual are best demonstrated by showing you a series of curves (see Figures I, II and III).

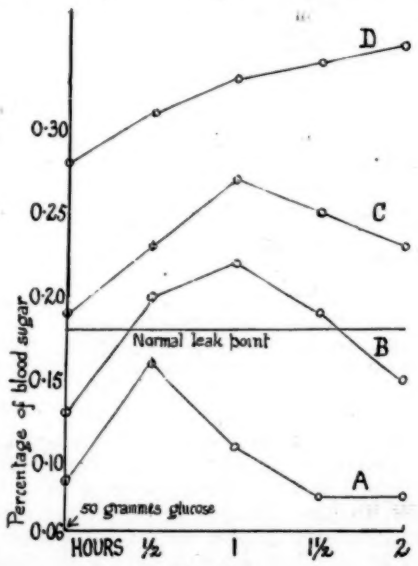

FIGURE I.

Blood sugar curves in glucose tolerance tests. A = normal, B = mild diabetes, C = moderately severe diabetes, D = severe diabetes.

There is one further point with regard to the diagnosis of which I would remind you; that is the danger of missing a mild case of diabetes through examining a specimen of urine passed during a

period when the blood sugar was below the threshold. I think this can be best explained by means of a diagram (Figure IV). This diagram shows roughly the blood sugar percentage throughout the day of a mild diabetic, and it can be seen at a glance that sugar will appear in the urine secreted only during that part of the day which includes the shaded areas;

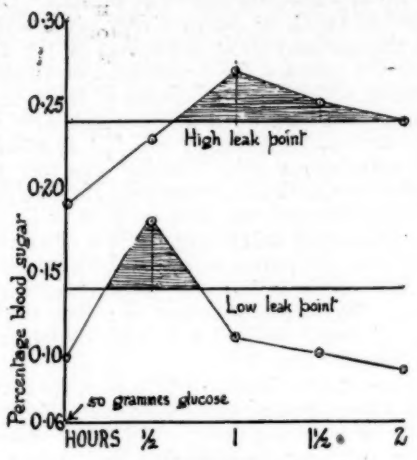

FIGURE II.

Blood sugar curves in glucose tolerance tests. A = renal glycosuria, B = old-standing diabetes with high threshold. The shaded area represents urinary sugar.

so that a morning specimen and possibly a late afternoon specimen of urine may not show sugar.

For this reason it is wise to request new patients to bring a specimen passed about an hour after their evening meal. If the patient is a diabetic, the evening specimen should certainly contain sugar.

Diabetics, in my experience, may be broadly divided into three classes: (i) The young patient with acute diabetes, that is children and young adults (under forty-five as a rule); these forms are characterized, as I have said before, by emaciation, weakness, thirst, hunger, polyuria and acidosis. (ii) The obese patient, most frequently a middle-aged woman in whom neuritis and pruritus are the outstanding symptoms. (iii) The elderly patient, whose diabetes is characterized by arterial degeneration, cataract and gangrene. The two last-mentioned types of patient, if they keep free of severe intercurrent disease, may live on untreated for years without developing a dangerous acidosis.

Ætiology.

Finally, before discussing the treatment, I should like to mention some facts with regard to the ætiology of the disease, which are helpful to a proper understanding of its treatment.

Heredity.—There is undoubtedly an hereditary factor in diabetes. One frequently finds several members of a family suffering from the disease, the disease having been present in members of the preceding generations. I have one patient at the present time who has two sisters and a brother, all of whom have diabetes, whose grandfather and father died of diabetes, and whose mother has mild diabetes.

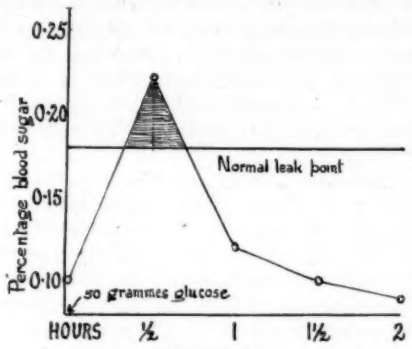

FIGURE III.

Lag type of curve in glucose tolerance test. Note the normal fasting level, rapid rise above normal and equally rapid fall. This is not indicative of diabetes.

Priscilla White,[1] in her series of some seven hundred cases in children and adolescents, finds definite evidence of the disease being transmitted as a simple Mendelian recessive, which, as she states, is very important in the control of diabetes, for, if she is correct, "the union of a diabetic with a diabetic is unwise, since all the offspring will eventually develop diabetes. The union of a diabetic with a person who has a diabetic taint should result in equal numbers of the children developing diabetes and not developing it. When

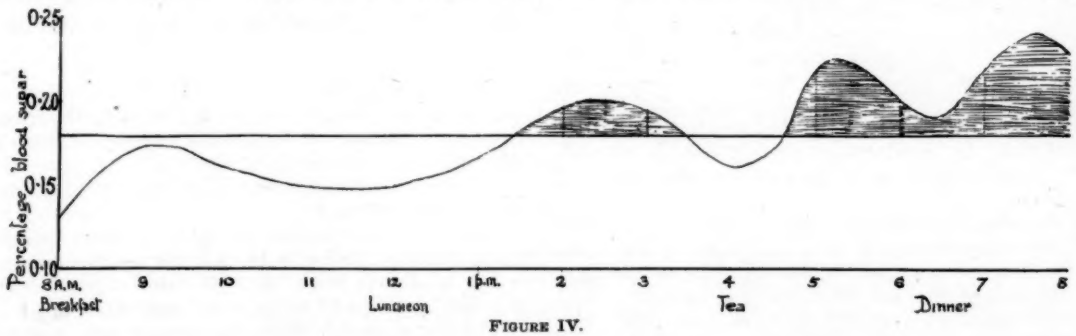

FIGURE IV.

neither parent has diabetes, but both have a diabetic taint, one-quarter of the offspring should develop the disease; but if a diabetic marry a pure non-diabetic, then none of the children should have diabetes."

Overweight.—Persons who are overweight are more liable to develop diabetes than thin persons. Joslin[2] states that amongst the predisposing causes overweight is preeminent and that the handicap of a diabetic heredity may be to a considerable extent counteracted by avoidance of overweight. Priscilla White[1] considers that overheight in children corresponds to overweight in adults.

Infection.—Infection lowers the diabetic's tolerance for carbohydrates and increases the severity of the disease, but it is doubtful if it is an ætiological factor. Joslin and others consider that infectious diseases may occasionally play a part in the ætiology.

The Nervous Element.—Nervous strain is undoubtedly of importance as a factor in the ætiology and will increase the severity of an established diabetes. A strenuous life has been considered by most authorities as of importance in the ætiology.

Hormonal Factors.—The theories of the ætiology of diabetes as a result of imbalance of other glands of internal secretion are based on the clinical coincidence of diabetes and hypoactivity or hyperactivity of the various glands. The association of hyperglycæmia and glycosuria with over-activity of the thyreoid, pituitary and suprarenal glands is well known. The converse also holds.

Treatment.

The foundation of our modern knowledge of the treatment of diabetes was undoubtedly laid by Allen in 1913, when he was able to prove, by his very extensive experiments on dogs, that, if a dog had the greater part of his pancreas removed, his future life depended entirely on his diet.

If the dog were fed on a high carbohydrate or high fat diet, or both, he soon began to develop a glycosuria, followed by all the typical symptoms of diabetes, from which he ultimately died. But if such a dog were fed on a low diet (that is, slightly undernutritional) he lived on in perfect health, though a bit underweight, and showed no symptoms of diabetes.

It thus became obvious that in the case of the partially depancreatized dog, in order to maintain health, it was essential to give the lowest possible diet necessary for the needs of the animal. The carbohydrates, of course, had to be restricted, but this restriction was found to be of little value if the other food substances were not also curtailed.

Allen came to the conclusion, as a result of his experiments, that the treatment of human diabetes should be approached in the same way and that the patient should be given the minimum of food necessary for the requirements of the body, and it is on this principle, that is, under-nutrition, that our modern conception of the treatment of *diabetes mellitus* is based. Allen's principles of treatment are so well known to you that it is unnecessary to do more than very briefly mention them.

As you know, after a day on a fat-free diet, he starved his patients until the urine was sugar-free, and it was found that this period of "alimentary rest" not only reduced the blood sugar within normal limits in all but the most severe cases, but also cleared up any acidosis that was present. He then proceeded to build up the diet very gradually, first finding the carbohydrate tolerance of the patient and then the protein (he never gave more than 1·5 grammes of protein per kilogram of body weight). Fat was then added until ketones appeared in the urine or the caloric value of the diet reached 1,500 to 2,000 calories per day. The diet was then fixed a little below the patient's tolerance. He also insisted on periodic fast days or days on half rations.

Joslin developed a different method of arriving at the same end. He gave a series of test diets, starting with a diet of about half the carbohydrate protein and fat of the normal diet and reducing the carbohydrate by nearly half each day until the patient's urine was sugar-free.

The patient was then put on a maintenance diet, with the same amount of carbohydrate, the protein and fat being increased. The diet was then gradually increased by changing the patient to the next higher maintenance diet each day until sugar appeared in the urine or until a satisfactory diet was reached.

In finally fixing a patient's diet they were guided by what they considered were the optimum requirements. They laid down that a diet, to conform to these requirements, must supply, as nearly as possible, the correct calorific requirements of the individual; it must contain the proper proportions of carbohydrate, protein and fat; it must satisfy in quantity and quality, as far as possible; and it must be accurate, simple to calculate, and permit of variety.

Let us consider these four requirements separately.

Calorific Requirements.

It has been estimated that the calorific requirements of normal individuals, under varying conditions, are, as stated by Joslin:[3]

At rest: 25 calories per kilogram per day, or 11 calories per pound.

For a sedentary life: 30 to 35 calories per kilogram per day, or 14 to 16 calories per pound.

For moderate work: 35 to 40 calories per kilogram per day, or 16 to 18 calories per pound.

For hard work: 40 to 60 calories per kilogram, or 18 to 27 calories per pound.

These figures are, I think, rather high for diabetics. I have never found it necessary to give a patient, even though he is doing labouring work, more than about 2,800 calories per day.

Proportions of Carbohydrate, Protein and Fat.

Two Americans, Shaffer and Woodyatt, first pointed out that a definite ratio must be preserved between the carbohydrate and fat of a diet if

ketosis is to be avoided. This ratio is now expressed as the ketogenic-antiketogenic or fatty acid-glucose ratio of the diet.

The fatty acid (F.A.) portion is made up of 0·9 of the fat and 0·46 of the protein of the diet, and the glucose (Gl.) by all the carbohydrate, 0·58 of the protein and 0·1 of the fat. This ratio should not exceed 1·5 if ketosis is to be avoided.

An optimum ratio of about 1·5 was the one most generally adhered to until recent years, as a higher ratio tended to produce ketosis and a lower ratio necessitated a diet of very low calorific value unless the carbohydrates were greatly increased. A maximum of about one gramme of protein per kilogram of body weight was allowed.

The last two requirements which I mentioned as essentials to a satisfactory diet are important in so far as it is obvious that if the quantity and quality of a diet does not satisfy a patient, or if it is very difficult to calculate, there is far more temptation for him to break it.

For this reason such schemes as the line ration scheme elaborated by Lawrence or, for the more intelligent class of patient, the five gramme scheme are extremely useful, as they provide a ready and easy means of arranging a diet with the minimum of calculation and also provide for very considerable variations, according to the taste.

Before the discovery of insulin the diet of a patient with severe diabetes was a very restricted one, with a low carbohydrate and a high fat content.

Although the discovery of insulin by Banting and Best, of Toronto, in 1921 immediately gave patients with the most severe diabetes (which could not be adequately controlled by diet) a vastly improved outlook, owing to the cost of insulin and the lack of knowledge of its mode of action the diet of the patient with moderately severe diabetes was not materially altered for a number of years.

The usual practice was to employ as small a dose of insulin as would enable a diabetic to take a diet of sufficient calorific value for his needs. Most authorities stressed the fact that insulin did not permit any relaxation in the accepted dietary rules, nor was it a cure, and that it was essential to adhere to the principles laid down by Schaffer and Woodyatt and give diets approximating the optimum F.A./Gl. ratio of 1·5. Lower ratios would yield fewer calories in proportion to the carbohydrates consumed, whilst higher ratios would cause poisonous acetone bodies to appear in the blood and urine.

When diabetes was discussed at the meeting of the British Medical Association in Edinburgh in 1927, attention was chiefly concentrated on the power of insulin to keep severe diabetics in normal health and to rescue them from coma; and no radical changes in diet were suggested.

Since then considerable changes have been introduced by various workers, who strongly advocate higher and more normal amounts of carbohydrates. In 1926 Sansum, Blatherwick and Bowden,[4] and in 1929 Geyelin and Mackie[5] published papers showing that much better results could be obtained if the carbohydrate was very considerably increased and the fat decreased.

In 1930 Rabinowitch[6] advocated a diet consisting of 250 grammes of carbohydrate, 70 of protein and 50 of fat—about 1,700 calories. He had treated a large series of patients for four years on this diet and showed that patients previously treated on a diet containing 50 to 100 grammes of carbohydrate required much the same amount of insulin when changed over to the high carbohydrate-low fat diet. He stressed the necessity of under-nutrition (as Allen did) if these results were to be obtained, and kept his patients about 4·5 kilograms (ten pounds) underweight.

Lawrence and others consider this diet, however, to be too low in calorific value for a patient of average weight to pursue any but a purely sedentary life.

Rabinowitch also stressed the point that as soon as the patient added more calories to his diet, perhaps unconsciously, in the form of fat, the high carbohydrates could not be tolerated without very large doses of insulin. He claims, however, that the high carbohydrate diets are more satisfactory to the patients, maintain their energy, though not their weight, at a normal level, abolish all traces of ketosis, and keep the blood cholesterol normal.

In 1931, 1932 and 1933 Eason and Murray Lyon,[7] of Edinburgh, made a very thorough investigation of various forms of diet, namely, optimum standard (F.A./Gl. = 1·5), intermediate (F.A./Gl. = 0·8) and low ratio (F.A./Gl. = 0·4). After carefully observing the clinical condition and insulin requirements of their patients on the different diets, they came to the conclusion that, if the fat of the diet was considerably reduced, an addition to the carbohydrate was possible without an increase in insulin; but this resulted in a lower caloric intake, as it was seldom possible to replace 100 grammes of fat by more than 70 grammes of carbohydrate without increasing the insulin; also that the fat in the diet appeared to make demands on the endogenous and exogenous insulin and that the insulin requirements of a diabetic seemed to be closely related to the total grammes of foodstuffs (carbohydrate, protein and fat). Finally, they were of the opinion that the diets of the intermediate ratio were the most satisfactory, that is, 125 to 150 grammes of carbohydrate, 70 of protein and 100 to 150 of fat.

They consider that these intermediate types of diet allow a slight variation in the amount of protein and fat, without upsetting the insulin balance; and they agree with Lawrence, who says, in commenting on Rabinowitch's diet: "I fail to see the advantage of jam and marmalade in a diet, if an extra rasher of bacon or a pat of butter is anathema."

Eason and Lyon found, particularly in the winter, that the very low fat content of Rabinowitch's diet was far more of a deprivation to the patients than the low carbohydrate of the old optimum ratio diet.

Ellis[8] recently, in view of the beneficial effects of high carbohydrate diets in diabetics, tried the effect of a diet of glucose on patients requiring large doses of insulin. He gave glucose by the mouth and small doses of insulin hourly to these patients over long periods (several weeks) and found that a remarkable improvement in their insulin efficiency occurred and that they needed considerably less insulin per gramme of carbohydrate in the diet to keep their urine sugar-free and their blood sugar within normal limits—that is, their carbohydrate-insulin ratio was higher.

The reason of this increased insulin efficiency was difficult of explanation, as the generally accepted theory until recently had been that excess of carbohydrate in the diabetic's diet stimulated his pancreas to an endeavour to produce more insulin and, by putting this strain on the diseased organ, caused a further degeneration of the cells of the islets and a deterioration in the clinical condition.

However, Himsworth[9] published a paper in July, 1934, giving the result of experiments on the effect of high carbohydrate-low fat, and low carbohydrate-high fat diets on the sugar tolerance and on the sensitivity to insulin in normal persons. He claims that his experiments, coupled with the experiments of Ellis, which I have already quoted, showed that the improvement of the diabetic patients on a high carbohydrate diet may be ascribed, not to the greater stimulation and consequent over-strain of their insulin-secreting tissue by excessive intake of carbohydrates, but rather to the rendering of the diabetic more susceptible both to his pancreatic and injected insulin. He considers that by thus lightening the burden on the cells which remain capable of function, it is possible that we aid their conservation as healthy tissue and save rather than squander the patient's own pancreatic resources.

As Himsworth points out, this suggests the possibility of the existence of a type of diabetes due, not to diminished secretion of insulin by the pancreas, but to an impairment of the organism's susceptibility to insulin.

During the past fifteen years I have had under my care a fairly large number of patients with diabetes in the out-patient department and the wards of the Adelaide Hospital. At first I followed closely the principles of Allen, as set out by Leyton, only giving insulin to those patients to whom it was impossible to give a diet of adequate caloric value without it. Later I did away with the preliminary starvation and, using the line ration scheme of Lawrence, put my patients on a three-line diet until their urine was sugar-free and their blood sugar came down to normal. I then proceeded to build up their diet by one line at a time until a satisfactory calorific value was achieved. If it was not possible to render the patient's urine sugar-free on the initial under-nutrition diet, after four days I started insulin, five units, night and morning and increased it by ten units every third day until the sugar disappeared from the urine, and then built up the diet, increasing the insulin as necessary. Recently, however, I have changed to a diet with a F.A./Gl. ratio of 0·7 to 0·8, and I now put my patients on a preliminary under-nutrition diet of about 1,100 calories and, if the urine is sugar-free, work them up in steps of about 200 to 300 calories every four to five days until they reach a satisfactory diet.

I aim at 120 to 150 grammes of carbohydrates. Insulin is used, of course, in cases in which the urine does not become sugar-free on the 1;100 calorie diet, or when I cannot attain a diet of sufficient calorific value without it.

In adults I rarely allow more than one gramme of protein per kilogram of body weight.

As soon as a patient has attained a diet of sufficient calorific value, he is encouraged to take his usual amount of exercise, so that his insulin dosage may be adjusted to his everyday requirements.

If desired, this method can be carried out by a simple modification of the lineation scheme.

On a diet of this type, that is, 150 grammes of carbohydrates, I find that the patients have a far greater feeling of well-being, are much more contented, and are less likely to succumb to temptation and to break their diet; and on the whole I do not think they require any more insulin than on the old type of diet; in fact many require less. In addition, they keep free of ketones and their blood cholesterol keeps within normal limits, which means that the disease is more completely under control. Presumably they will be less liable to complications, such as arterial degeneration and cataract, which undoubtedly occurred in some apparently satisfactorily controlled cases on the old diets.

In every case a thorough systematic search is made for any septic foci which may be present. These are dealt with as soon as possible.

I limit the insulin to two injections a day, whenever possible, as more than this number are extremely irksome to the patient. However, in some severe cases, in order to control the disease satisfactorily, it is necessary to give a midday injection, and sometimes a late evening one, followed by a glass of milk or light supper.

About a year ago Lawrence[10] advocated a form of treatment which he had used in a large number of patients. He was influenced by the facts that the most important point in insulin cases is that the patients be given a regular amount of carbohydrate, balanced by its correct dose of insulin; that the minimum of carbohydrate necessary in a diet, if ketosis is to be prevented, is about 100 grammes; and that, if high carbohydrate diets are given (200 grammes and over), great care is necessary to restrict the protein and fat, if enormous doses of insulin are to be avoided.

He therefore placed his patients on 100 to 150 grammes of carbohydrate, covered by its correct dose of insulin, and allowed them to eat protein and fat to taste.

He is of the opinion that the glucose derived from protein and fat enters only slowly, and over

a period of days, into the insulin requirements and need not be considered if the carbohydrates in a meal be accurately measured and balanced by insulin. This diet allows a considerable variation, according to the activities, and consequently appetite, of the individual.

I have quite recently, in a selected few of my milder insulin cases, allowed the patients to try this method; and so far their condition is quite satisfactory, though some of them require slightly more insulin than formerly. However, I consider that this is a method that is applicable only to the few very carefully selected patients who can be thoroughly relied upon, as I am opposed to any method of treatment for general use which introduces an element of carelessness into the dietary *régime*.

Treatment of Complications.

Such complications as arterial degeneration, gangrene, cataract and retinitis are best treated by prevention, that is, by a proper control of the disease. The same, of course, holds for all complications.

Since the discovery of insulin it has been possible to treat gangrene on conservative lines instead of by the immediate high amputation which used to be advocated.

Arterial degeneration is generally considered to be caused by the high blood cholesterol which occurs in improperly controlled diabetics, especially when ketone bodies are constantly present in the blood, so that the low ratio diets should certainly lessen the tendency to this complication.

An early opacity of the lens will frequently completely disappear when, as a result of treatment, the blood sugar is brought within normal limits. Cataract may now be treated by operation at the appropriate time, if the patient's diabetes is under control.

Intercurrent Infections.

Any acute intercurrent infection, by depressing the sensitivity of the individual to insulin, is apt to cause a severe ketosis and may precipitate coma. In all such cases the diet should be suited to the disease and sufficient insulin should be given to keep the blood sugar within normal limits.

A few diabetics under my care contracted severe attacks of influenza in the recent epidemic. They all did well on diets consisting of large quantities of sweetened fluids and milk foods with considerably increased doses of insulin.

Local infection or sepsis, such as septic teeth, boils, carbuncles, septic tonsils *et cetera*, should receive treatment at the earliest possible moment. This generally leads to a marked improvement in the diabetic condition.

Tuberculosis.

Tuberculosis is a common complication, especially in untreated diabetics. Infected patients should be put on a more liberal diet than the non-tuberculous diabetic. It is wise to give an adult at least 35 to 40 calories per kilogram, with sufficient insulin to cover it.

When the stage of emaciation is reached, the carbohydrate tolerance frequently improves and the insulin must be reduced.

In carefully controlled diabetics the prognosis of tuberculosis is not materially worse than in the non-diabetic tuberculous patient.

Coma.

Diabetic coma represents the end-result of uncontrolled diabetes and is due to the poisonous products of imperfect fat metabolism which accumulate when insufficient sugar is being burned in the tissues. As Lawrence says "Insulin burns glucose, and together they soon remove the ketones." Insulin should be given as soon as possible, as a delay of a few hours will frequently allow a patient in the precomatose state to progress into a state of profound coma from which it is very difficult to save him.

In coma there are two conditions to combat: the ketosis and the dehydration and consequent collapse.

The dehydration and collapse must be treated by warmth, cardiac stimulants and, most important, by abundance of fluids. The ketosis is treated by large and repeated doses of insulin, covered by glucose, one gramme to the unit. From the point of view of treatment these patients can be divided into: (i) the precomatose patients, (ii) the patients in complete and profound coma. The first may be very drowsy and show typical air hunger and occasional vomiting; but as a rule the necessary sugar and fluids can be given by the mouth. The comatose and the precomatose patients with continuous vomiting require intravenous administration of saline solution, insulin and glucose.

The first dose of insulin in either case should be given intravenously. Precomatose patients should be given 50 grammes of glucose by the mouth in a pint of water, flavoured with orange or lemon, and 50 units of insulin intravenously as a first dose, and then 40 grammes of glucose and 40 units of insulin every four hours, and as much fluid as they will take. The urine is tested before each dose of insulin and the degree of glycosuria and ketosis is carefully noted.

When the diacetic acid disappears from the urine and there is only a trace of sugar the next dose of insulin should be reduced to 30 units, but the glucose kept at 40 units. If the next test shows no reduction of Benedict's solution, the insulin should be still further reduced (to 20 or 15 units). When the general condition of the patient is satisfactory he should be put on a diet of 120 grammes of carbohydrate, consisting chiefly of milk and milk foods, and insulin should be given four times a day in sufficient dosage to keep his urine sugar-free.

As his condition permits, other foods should be added until he is on his ordinary diabetic diet. Whenever possible, patients should be controlled by frequent blood sugar estimations until their con-

dition is satisfactory, especially as the dehydration frequently results in anuria, which may persist for several hours and which may prevent control by urinary tests.

In the severe vomiting cases and cases of profound coma the same principles are carried out, but the fluids must be given intravenously until the vomiting ceases. The glucose and insulin can be conveniently administered intravenously with the saline solution.

These are the general principles of treatment of coma cases. I have found it necessary in cases under my care to vary the amount and frequency of administration of insulin and glucose considerably, according to the manner in which the patient responds to treatment.

It is wise in all coma cases to wash out the stomach as early as possible, as this frequently stops the vomiting and permits fluids to be taken by the mouth; in addition, the bowel should be washed out, as it may be necessary to give fluid by this route if vomiting cannot be controlled.

In all cases a thorough examination of the patient should be made as soon as possible so that any intercurrent infection, acute or chronic sepsis or other condition which may have precipitated the coma, can be discovered and treated.

Practically all the precomatose and a considerable percentage of comatose patients can be brought back to consciousness and their ketosis and hyperglycæmia can be cleared up by these methods of treatment. However, it is not uncommon for a patient who has been brought back to consciousness from deep coma and whose ketosis seems to be satisfactorily controlled, to collapse suddenly and to die from circulatory failure in spite of large amounts of fluid having been administered.

Surgical Complications.

With the proper pre-operative and post-operative use of insulin and glucose most necessary surgical procedures may be carried out in diabetics without very much greater risk than in the non-diabetics.

In non-urgent operations, such as those for the removal of septic tonsils or of an infected gall-bladder, the patient should be put in a state of normal metabolism, with the urine sugar and acetone free and with normal blood sugar, before the operation. About an hour before the operation glucose and insulin should be given (40 grammes of glucose and 20 units of insulin) in order to prevent the onset of post-operative ketosis and also to protect the liver from damage by the anæsthetic or toxins.

After the operation the patient should be put on a diet appropriate to the surgical condition for the first few days, and sufficient insulin should be given to balance it.

Anæsthetics.—Local or spinal anæsthesia or ethylene and oxygen should be used whenever possible. Ether may be given by the open method if these methods are not available. Chloroform should never be used.

Patients subjected to serious emergency operations should be treated on the same lines as patients with coma.

Insulin and its Administration.

In conclusion I should like to stress some points with regard to the use of insulin.

In the first place I consider that the following patients require treatment with insulin.

1. All patients not able to attain a sufficiently high calorific diet without it.
2. All patients who are in coma.
3. Most patients with mild diabetes complicated by intercurrent infection or by great mental stress.
4. Patients whose diabetes is complicated by gangrene.
5. All diabetics before and after operation.
6. All child diabetics.

In insulin cases increased dosage will be required if the diabetic condition becomes worse, during periods of mental stress, during the course of intercurrent infections, and in the presence of ketosis.

Decreased dosage is necessary when there is an improvement in the diabetic condition, during periods of excessive exercise, and in the early stages of sea voyages, or when food cannot be retained from any cause.

Exercise.—Owing to the increased combustion of carbohydrate necessary for the production of energy, exercise causes a decrease in the amount of insulin necessary to keep the blood sugar normal in an insulin case; strenuous exercise may bring on a severe hypoglycæmia if the previous dose of insulin has not been considerably reduced.

One adolescent patient of mine who was normally on 40 units of insulin a day, was able to reduce his dose to 15 units a day whilst training for a mile race, and even then he occasionally had mild hypoglycæmic attacks.

Sea Voyages.—Prior to starting and during the early stages of a sea voyage it is wise for a patient to cut both his diet and his insulin down, as a large dose of insulin taken just prior to starting, followed by the loss of the greater part of his meal through seasickness, might bring on a hypoglycæmic coma.

Hypoglycæmia.—All persons taking insulin run the risk of hypoglycæmia. It may arise from an improvement in the diabetic condition or an overdose of insulin or, as I have already stated, from excessive exercise or from not retaining food, as in seasickness or any other cause.

The onset of this condition is recognized by hunger and increasing weakness, perspiration, blurred vision and diplopia. There is a gradual collapse, with a subnormal temperature and rapid pulse. The symptoms may lead rapidly to convulsions and coma. The blood sugar will be found to be considerably below normal.

Carbohydrate orally administered to those patients who are able to swallow raises the blood sugar sufficiently in a few minutes to cause the symptoms to disappear.

If the patient is comatose, 20 grammes of glucose in a 20% solution should be administered intravenously.

Patients taking insulin soon learn to recognize the early symptoms of hypoglycæmia, and should always carry one or two lumps of sugar or an orange or other carbohydrate, which should be eaten on the symptoms making their appearance.

Conclusion.

I have endeavoured to put before you tonight, in a general way, the modern principles of the treatment of diabetes and its complications, and to give you very briefly some account of the work done in the past twenty years which has been responsible for the evolution of these principles.

I hope that this paper may be productive of a discussion that will be of practical interest and value.

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TUBERCULOSIS TODAY AND AUSTRALIA'S OPPORTUNITY.[1]

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TUBERCULOSIS is the most serious of the infectious diseases confronting civilized communities today. Its widespread incidence, its chronic character and its proneness to attack and to destroy young adults make it a problem of the utmost importance. The high community value of its victims, mostly in the prime of life, makes it a serious matter from the purely economic standpoint. Indeed, from this point of view even cancer is less important than tuberculosis, for cancer selects for its onslaughts people of older age groups. In Australia each year tuberculosis kills 3,000 people, two-thirds of them under the age of forty-five. Cancer annually kills 6,000 Australians, but two-thirds of these are over sixty years of age.

Until recent years the world as a whole appeared to have become resigned to the presence of tuberculosis or to have regarded it with the indifference bred of long and intimate association. Even now the efforts to abolish the disease are not being pursued as vigorously as they ought to be. This is the more surprising when it is remembered that the nature and manner of spread of tuberculosis are now well known. Science has done its part in elucidating the nature of the disease; it remains for communities to apply the knowledge in a vigorous manner.

Yet it must be admitted that the application of our scientific knowledge to eradicate tuberculosis is not altogether an easy matter. There is no simple drug cure for tuberculosis in the human subject, as there is for syphilis. The eradication of the disease, according to present knowledge, depends, not on drugs, but on the adoption by the community of a definite and comprehensive plan of attack. Nor is the problem solely a medical one. Indeed, it is largely one of economics and sociology.

The work of the "Cattle Diseases" inquiry conducted in England recently has shown the way to abolish bovine tuberculosis from dairy herds. In the case of the human subject we are not permitted to destroy sufferers, however advanced their illness may be; but even with this limitation we have the means at our hands for disposing of the disease. In most countries antituberculosis work is taking a prominent place in public health practice. The scheme I submit embodies modern and well proven methods of procedure, but it is wider in its scope than the plan adopted in any one country.

Comprehensive Scheme for the Eradication of Tuberculosis.

1. *Sufferers.*

The National Tuberculosis Scheme of England provides a sound basis for action, and its main features are included in this scheme. The requirements are:

(*a*) Recognition of the disease in its early stages. The periodic health examination of the whole community (discussed below) will help materially in detecting early cases.

(*b*) Supervision of homes by health authorities, assisting in the proper care of patients and the protection of other members of the household.

(*c*) Provision of dispensaries or clinics for the investigation of ambulant cases.

(*d*) Provision of sanatorium hospitals for the investigation, observation, treatment and training of patients.

(*e*) Establishment of village settlements, as at Papworth in England. These provide adequate care and suitable occupational therapy for chronic sufferers, protection for their families, and health education and continued supervision for all the residents.

[1] Read at the annual meeting of the Australian and New Zealand Association for the Advancement of Science, January, 1935.

(*f*) Care committees and health visitors, to insure that patients get proper after-care on being discharged from sanatoria to their homes, and especially to assist in solving problems of finance and employment.

(*g*) Pensions, on liberal scale, available to every sufferer. The fear of unemployment and resulting poverty causes many sufferers to delay in seeking medical aid till the disease is well advanced. Varrier-Jones, of Papworth, has said that if tuberculosis limited its attacks to the rich, success in overcoming it would be achieved without difficulty.

2. *Persons Suspected to be Suffering from Tuberculosis.*

Thorough investigation of "suspects" is necessary. Until this is completed persons of this group should be regarded as sufferers and dealt with on similar lines. Clinical and X ray examinations, tuberculin testing, and suitable hospital accommodation are necessary adjuncts.

3. *Persons Who Have Been in Contact with Sufferers.*

In view of the wide incidence of the disease it might be said that every individual in the community is a "contact". Those who have had close contact with sufferers should be subject to repeated examinations and medical surveillance. Suitable institutions (sometimes called preventoria) are necessary for the care of weakly children, especially for those who have come from tuberculous households. Open air schools are also essential for such children. In the past there have been too exclusive attention to clinically tuberculous adults and too little to infected children. Such supervision as is provided at Papworth and similar settlements is the ideal to be aimed at.

4. *The General Community.*

The plan requires that the whole community shall to a certain extent be under medical surveillance. The special features are:

(*a*) People must be instructed in the nature and importance of the minor symptoms of the disease and in the principles of personal hygiene. The value of fresh air, correct dieting and orderly living as safeguards against the disease are to be stressed in health education.

(*b*) Provision of good housing, on which the general health of a community depends to so great an extent.

(*c*) Protection of babies born into tuberculous households. The susceptibility to infection in the first years of life is very great.

(*d*) Supervision of the health of children: (i) Nutrition requirements must be met. In England milk is issued at schools, and in some instances meals are provided. (ii) Open air schools are suitable for all children, strong and weakly alike. (iii) Tuberculin testing of children and X ray examination of positive reactors. This is the basis of the Massachusetts (United States of America) Ten-Year Plan. (Under this scheme over 300,000 school children have been investigated; 70,000 reacted to tuberculin, indicating the occurrence of infection in this group; and 5,000 had X ray signs of disease.) The early cases of childhood tuberculosis, of insidious onset, are detected and cared for; the source of the infection, usually a person in the child's home, can be investigated and dealt with.

(*e*) Periodic health examinations. Under the present arrangements the health of the community is really in the hands of laymen, for it is usually only when people fall ill that they consult their doctors. Under this plan the doctors seek out the sufferers from incipient disease. The only way to achieve this satisfactorily is by the compulsory medical examination of every member of the community at regular intervals.

5. *Action Against Bovine Tuberculosis.*

The plan of attack against bovine tuberculosis is outlined in the report of the influential special committee appointed by the Economic Advisory Council in England to investigate cattle diseases. This report was published a few months ago. It states, *inter alia*, that sufficient scientific knowledge now exists to enable bovine tuberculosis to be eradicated from dairy herds. The report should be referred to for details of the committee's plan.

6. *Legislative Procedures.*

In most countries at the present time a certain amount of legislation exists designed to deal with the tuberculosis problem. The scheme I put forward for consideration would require the following:

(*a*) Tuberculosis in all its forms should be notifiable to health authorities.

(*b*) Adequate pensions should be provided, even for those suffering from early stages of the disease.

(*c*) Power to remove to hospitals patients suffering from advanced disease, in cases where the home conditions are unsuitable or where the risk of spread of disease would be great.

(*d*) Compulsory periodic health examination of all members of the community.

Comment on the Scheme.

This is the plan that I submit for discussion. I have presented it in mere skeleton outline, for its amplification would occupy more time than I am permitted. Its essential features are: (i) adequate care of sufferers and the provision of village settlements; (ii) recognition of early cases, especially by such means as the "Massachusetts Plan"; and (iii) periodic health examinations.

Many will say that there is nothing new in it. I frankly admit the charge. Further, I claim its lack of originality as its chief merit and recommendation. Every step of it has been practised and proved in some part of the world. What has been lacking is the application of all the means in one country at one time. Will our country be the first to piece together the complete "jig-saw"? It requires a comprehensive and simultaneous attack in the manner I have sketched for a community to free itself of the disease.

Again, some may say that already tuberculosis is gradually being conquered. That fact is unassailable. In England and Wales fifty years ago the deaths from tuberculosis each year were about 70,000; for the last ten years the average number of deaths was 40,000; in 1933, 33,000 persons died from the disease. In Australia similarly the death rate has been halved in the past thirty years. Yet, if our enemy be "on the run" now, surely the time is most opportune for us to intensify our attack and assure ourselves of victory.

Of course the cost of this war on tuberculosis is very great. Much money is necessary and much bother is involved. The demands of a whole-hearted warfare are exacting. Our best experts in medicine, in economics and sociology must be engaged to direct the forces. As in wars of destruction, so in this war of construction, the whole community must bear the expense.

In Australia we are more favourably placed for launching an all-front attack against tuberculosis than are most other people. The incidence of the disease and the mortality rate are already lower than in other countries. Our climatic conditions are excellent. The general health of our people is relatively good. We are unhampered by a mixed population, with varying hygienic standards. We have efficient quarantine arrangements. We can submit to the discipline of good government.

Surely the possibilities are great. With our present knowledge, properly applied, the disease could be stamped out of Australia within fifty years. The question no longer is: "Can tuberculosis be conquered?" but rather: "Will it be? And when? And where?" It is Australia's opportunity to make world history against "the white scourge". Can we rise to the great occasion?

THE CASE OF LADY FLORA HASTINGS.[1]

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IT is not quite three years since there died an exquisite artist in words, Giles Lytton Strachey. As is well known, since the War a new school of biography has arisen; it might almost be said that a new literary art form has been created. Its most eminent exponent was the Englishman, Lytton Strachey, and his followers are the French Jew, André Maurois; the German Jew, Emil Ludwig; and the Englishman of Spanish extraction, Philip Guedalla. They have rendered biography more readable and perhaps more sincere by their revision of the previous canons of what must be put in a life and what must be omitted.

[1] Read at a meeting of the Section for the Study of the History of Medicine and of the Gynæcological and Obstetrical Section of the Victorian Branch of the British Medical Association on November 22, 1934.

Our newer biographers are all intellectuals; they are all genuine historical researchers, and they are all masters of the written word. By means of their abilities and their freedom from past conventions, they have painted vivid portraits of their subjects on much smaller canvases than their famous predecessors. An enormous amount of industrious research and scholarship can be put into a biographical work, and yet the author may fail to present a living portrait of his subject. Such an example I would suggest, in all humility, is the monumental "Life of Milton", in six volumes, by Dr. David Masson, the distinguished one-time Professor of English in the University of Edinburgh, and Historiographer Royal for Scotland. As many here tonight know far better than I, this work, which took twenty-one long years to complete, contains an amazing amount of information on the contemporaries and the time; yet, as I see it, the portrait of the poet is lost in a forest of erudite detail. However, that was the type of biography which literary and scholarly convention demanded fifty years ago.

Perhaps the most striking feature of the brilliantly written newer biographies is their apparent candour, by means of which their entertainment value is vastly increased. They indeed read like absorbing novels. In matters of candour, irony and exquisite writing, Strachey has no peer. He fascinates us by his use of a pen of diamond-like hardness to scrape off the whitewash from the great figures of the past; particularly vigorous is his scraping of the pillars of Victorian history, which, when denuded of their veneer, may certainly look more real, but sometimes inexplicably ridiculous. Thus, as Walter Murdoch has written, he tickles our vanity by giving us a delightful sense of superiority over people who have previously somewhat overawed us.

On the other hand, the newer and shorter biographies may possess certain weaknesses inherent in their very brevity. However much we admire this type of work, it must be acknowledged that in essaying and achieving history, candour and irony in a comparatively few beautifully polished sentences, the fascinating result may be somewhat untruthful or, rather, it may not be able, on account of the limitations of the method, to produce the whole truth. Such omissions may result in grave injustices. It is of such an injustice, or what I deem an injustice, that I speak tonight.

Two men, one better known than the other, brought forth a supercilious smile when they came within view of Strachey's amazingly sharp eyes; the first, a Major-General of Engineers who died at Khartoum, and the other Queen Victoria's Physician, who played a leading rôle in the affair of Lady Flora Hastings. Strachey proceeds to put Charles Gordon on the rack in the volume "Eminent Victorians", and to pillory James Clark in the volume "Queen Victoria". I can never laugh heartily when Scotsmen are publicly ridiculed; and so, with the

material available in our Melbourne libraries, I have attempted to elicit the truth about the Scotch physician.

On the sea coast, some 50 miles to the east of Inverness, lies the royal burgh of Cullen. Here, in December, 1788, was born James Clark, later to be, for forty years, the trusted friend and medical adviser of the most famous queen in English history. He was to play a principal rôle in two tragedies, one of which not only almost ruined him, but shook the very foundations of the throne itself. Surviving these adversities, he was to die full of years and of honours in 1870.

Clark's early history possesses an element of romance. Winning a bursary to the Aberdeen University, he took the M.A. degree and returned to Banff and entered the office of a writer to the *Signet*. A thoughtful young man, he soon found that the law would not suit him and he turned south to Edinburgh, where he took the medical diploma of M.R.C.S. in 1809. He immediately entered the Navy as Assistant-Surgeon, and served in North America and the West Indies. Life in the Navy was eventful: he was shipwrecked twice and also served with Parry, the Arctic explorer, in experiments on the temperature of the Gulf Stream. After Trafalgar, he was placed on half pay and was out of a job. He filled in the subsequent four years in taking phthisical patients to the Continent and obtaining the Edinburgh M.D. In 1819 he settled in Rome, and soon had the leading practice in this city, where he attended Keats during his last illness. Readers of Keats's life will remember how Clark's kindness to the unhappy poet is recorded, and they will remember, too, that Keats was trained as a surgeon and actually passed his examinations at the Apothecaries Hall.

Every summer, Clark used to visit continental spas studying climate and enlarging his acquaintance with the wealthy section of English society. One year he met at Carlsbad Prince Leopold of Saxe-Coburg, the uncle of the future Queen Victoria. He made a distinct impression on Leopold, who was considered one of the best judges of character in Europe. Leopold, a German in every fibre of his body, was profoundly impressed by this Scottish physician who had the gumption to investigate the health-giving properties of German baths; so when Clark left Rome in 1826 to settle in London, he was appointed Leopold's physician. This led to his introduction to the English Royal Family, and in 1834 he was appointed physician to the Princess Victoria and her mother, the Duchess of Kent. When Victoria ascended the throne in 1837, and her suite had to be appointed, a list of physicians was submitted to her by the Premier, Lord Melbourne. The Queen saw at the very bottom of this list the name of James Clark. She took up a pen and, crossing out the name, wrote it at the top. This appointment caused much chagrin and disappointment to the exclusive College of Physicians, the fellows of which looked on the appointment of a northern graduate in much the same light as the College of Surgeons might view the intrusion of a radiologist. Sir Benjamin Brodie was their nominee, and it was inexplicable that he should have been overlooked for a parvenu like Clark. A baronetcy, which Clark was at first not inclined to accept, followed as a matter of course, and apparently an immense field of prosperity lay before him. But within two years of his appointment his career was almost wrecked by the tragic affair of Lady Flora Hastings. The Queen was at this time twenty years of age, and Clark fifty-one.

Who Was Lady Flora Hastings?

Lady Flora Hastings was the eldest child of the first Marquis of Hastings, who was Governor-General of India from 1813 to 1823. At the time of which I speak (1839), Lady Flora was an unmarried woman of thirty-three, and for some years had been a Maid-in-Waiting to the Duchess of Kent, Queen Victoria's mother. Lady Flora had both Ulster and the bluest Highland blood in her veins. Her father, Francis Rawdon, came from Moira in County Down. For distinguished services, both as a soldier and administrator, he was made Earl of Moira, and at the time of Lady Flora's birth was Commander-in-Chief in Scotland. From 1813 to 1823 he was Governor-General in India, being created first Marquis of Hastings; he died in 1826, seven years before Lady Flora's affair, at which time her brother had become the second Marquis. The first Marquis was no relation to the more famous Warren Hastings (1732 to 1818), who was Governor-General of India from 1773 to 1785. Her mother was Lady Flora Campbell, in her own right Countess of Loudoun in Ayrshire, and her grandmother was Flora Macleod of Raasay—a small island off the east coast of Skye—whose brother had assisted Prince Charlie to escape after the '45.

There was therefore nothing in Lady Flora's ancestry to suggest that she would stand "hanky-panky" from anyone in the Kingdom.

And here we might consider the part played by Lady Flora Hastings in the pastoral development of Victoria.

There came overland from Sydney in 1838, along the track that had been made two years before by Hepburn, Hawdon and Gardiner, a man named Henry Kent Hughes, founder of the Kent Hughes dynasty of this city. Surrounding the present township of Avenel, he took up a run of 60,000 acres, sufficient to graze 15,000 sheep. A year later, that is, in 1839, a party of vigorous young Edinburgh men, in charge of the Watson brothers and Alec Hunter, also came overland looking for pastures new, and before reaching Kent Hughes's domain, turned eastward up the Broken River and selected a large tract of country—800 square miles in all—along the upper Goulburn, and surrounding the present town of Mansfield.

The Watson brothers and Hunter had plenty of Scottish capital, to which the principal subscribers were Lady Flora Hastings, her cousin the Marquis of Ailsa, and Captain Arabin, Housekeeper to the Duke of Buccleuch, head of the famous Border family of Scott. Operations, however, were unsuccessful, largely owing to the financial crisis of 1840 to 1841 in the young colony, and some short time after Lady Flora's death in 1840, this large pastoral company was forced into liquidation. This was one of the few unsuccessful Scottish enterprises in early Victoria, the majority of which, as you know, were eminently successful. Another uncompleted Scottish project was that of Æneas Ronaldson McDonnell, Lord Glengarry, who as a young man of twenty-two, in 1841, took up "Greenmount", in the Gippsland district. Lord Glengarry was the chief of the Glengarry branch of the Clan Macdonald, of which there are three branches: (1) Sleat, the chief of whom is also the Lord of the Isles, (2) Clan Ranald, and (3) Glengarry. In the thirties and forties, times were bad in Scotland, particularly for the crofting communities, and Glengarry had proposed to transport his whole clan from their native glens to the country surrounding the Latrobe River, but the plan failed of fulfilment, and the Glengarry left Gippsland within twelve months to return to Scotland. How the lyre-birds would have startled at the sound of the pibroch as the Highlanders marched from Port Albert into the Gippsland forests!

A link with Messrs. Watson and Hunter remains today on the pastoral country of the upper Goulburn, where two well-known Victorian families are amongst the landowners. In 1850 Alec Hunter married Elizabeth Bostock, and at present a Mr. John Bostock owns "Preston", near Mansfield, while the Bostocks are connected by marriage with the Ritchies, who now own "Delatite". Thus is the name of Lady Flora Hastings associated with the early pastoral development of Victoria. For a very complete map showing the early pastoral leases we are indebted to Messrs. Billis and Kenyon, of this city. Mr. A. S. Kenyon is happily with us tonight. Messrs. Billis and Kenyon have done an immense amount of genuine historical research into early Victorian history, and the names of these gentlemen must rank with those of Professor Ernest Scott and other eminent Australian historians.

What was the Affair?

Lytton Strachey, in paragraph 6, chapter 3, of his "Queen Victoria", describes the affair thus:

> Early in 1839, travelling in the suite of the Duchess, Lady Flora returned from Scotland in the same carriage as Sir John Conroy. A change in her figure became the subject of an unseemly jest; tongues wagged; and the jest grew serious. It was whispered that Lady Flora was with child. The state of her health seemed to confirm the suspicion; she consulted Sir James Clark, the Royal Physician, and after the consultation Sir James let his tongue wag too. On this, the scandal flared up sky-high. Everyone was talking; the Baroness was not surprised; the Duchess rallied tumultuously to the support of her lady. The Queen was informed.
>
> At last the extraordinary expedient of a medical examination was resorted to, during which Sir James, according to Lady Flora, behaved with brutal rudeness, while a second doctor was extremely polite. Finally, both physicians signed a certificate entirely exculpating the lady.
>
> But this was by no means the end of the business. The Hastings family, socially a very powerful one, threw itself into the fray with all the fury of outraged pride and injured innocence. Lord Hastings insisted on an audience with the Queen, wrote to the papers, and demanded the dismissal of Sir James Clark. The Queen expressed her regret to Lady Flora, but Sir James was not dismissed. The tide of opinion turned violently against the Queen and her advisers; high society was disgusted by all this washing of dirty linen in Buckingham Palace; the public at large was indignant at the ill-treatment of Lady Flora. By the end of March the popularity, so radiant and so abundant, with which the young sovereign had begun her reign, had entirely disappeared, so much so, that later in the year, at Ascot, she was to be publicly hissed at by a certain section of aristocratic society.

From this graphic account one gains two bad impressions of Sir James Clark: (i) That he was an incompetent doctor, and (ii) of a much more serious nature, that he was a middle-aged tittle-tattle who had betrayed a professional trust.

I think that Strachey does Clark much less than justice. That Sir James's handling of the case is open to criticism is certainly true, but that he was an ignorant scandal-monger is far from the case. As in the case of the other man of Scotch ancestry, Charles Gordon, Strachey's process of "debunking" —a horrible word of transpacific coinage, but somewhat expressive—needs some correction. In passing, a variation in the meaning of the word "affair" during the past century might be noted. Contemporary medical and lay journalism referred to the history of Lady Flora's last months as the "affair of Lady Flora Hastings". Since then the word has developed a meaning relating to a certain aspect of social behaviour, and to the modern mind might suggest an already formed judgement of Lady Flora's conduct.

A more complete account of the affair is this: On January 10 Lady Flora first consulted Sir James. She complained of derangement of the bowels and of her general health, associated with a pain low down on the left side, together with an enlargement of the lower part of the abdomen. Under simple remedies, the bowels were corrected and the left-sided pain ceased. Lady Flora complained then only of weakness, though the abdominal enlargement persisted. She continued to perform her usual duties around the Palace, with apparently no inconvenience to herself. On February 1, Sir James was sent for by the Prime Minister, Lord Melbourne, who informed him that Lady Flora's appearance had given rise to suspicion in the Palace that she was pregnant; the gossips were saying that if she were not secretly married, she certainly should be. Melbourne asked for Clark's opinion. It was given by the Court Physician to him alone, and, as one would expect, in the strictest confidence. Clark stated that while such rumours ought not to be readily listened to, he was bound to admit that the

appearance of Lady Flora in some degree countenanced the rumours, but that without ample means of observation and examination, he could not venture to give an opinion on the subject. Melbourne agreed that no step should be taken in the matter. We learn that Clark, at this stage, was worried as to what condition, other than pregnancy, could be responsible for Lady Flora's appearance. The only condition, he considered, that might give rise to this enlargement would be severe abdominal disease, but as Lady Flora's general health was so little affected and she could perform her duties as usual, Clark felt that the weight of evidence was against abdominal disease. He continued to visit her twice weekly. On several occasions he examined the state of the abdomen over her dress. After his interview with Melbourne, he expressed to her his uneasiness concerning her size, and asked whether, at his next visit, he might be permitted to lay his hands on her abdomen with the stays removed. To this Lady Flora declined to accede. Matters remained in this state of uncertainty for Clark until February 16. On this date, Clark was told by Lady Portman that the Queen had ordered that Lady Flora should be acquainted with the suspicion concerning her, and that the Queen would not permit Lady Flora to appear at the Palace table until she had been medically examined, and that another physician should be called in consultation. Immediately on receipt of this information, Clark went to Lady Flora for the purpose of making known to her this very unpleasant communication. After a few remarks on the state of her health, he told her that her size had attracted the attention of the ladies, and that it was his painful duty to acquaint her ladyship that he had in consequence been led to the belief that she was privately married. He urged Lady Flora, for obvious reasons, if there were grounds for suspicion to acknowledge the fact or, if not, to see another physician at once, to put an end to the rumour. Lady Flora denied the accusation, and she refused to see another doctor that day, but stated that if her mistress, Her Royal Highness the Duchess of Kent, wished, she would see Sir Charles Clark, who was physician to the Hastings family. Sir Charles was in no way related to Sir James.

Obtaining Lady Flora's consent to go to the Duchess of Kent and communicate to her what had occurred, Sir James saw the Duchess, who, after expressing her firm belief in Lady Flora's innocence, asked Sir James his opinion. He replied that, however reluctant he was to express any doubts on Lady Flora's condition, the suspicions he had previously entertained were not removed.

On the following day, however, Lady Flora was medically examined by both Sir James and Sir Charles, who issued a certificate stating that, though there was enlargement of the stomach, there were no grounds for suspecting that pregnancy did exist, or ever had existed. It is curious to note that in all accounts of Lady Flora's illness the important question of amenorrhœa is never discussed, nor even mentioned.

The Source of the Rumours.

The source of the persecution of Lady Flora was something more than mere feminine uncharitableness. There were strong personal and political reasons. Unhappily, the ladies of Buckingham Palace at this time were divided into two rival factions. Those surrounding the Queen's mother were, like Lady Flora, from Conservative families, while the Queen's personal attendants had been appointed by the Whig political party, of which Melbourne was the leader. But there was another, more powerful, influence immediately behind the throne, that of Baroness Lehzen, the young Victoria's devoted confidante. Fräulein Louise Lehzen had come to England as governess to Princess Feodore, of Leiningen, Victoria's half-sister, shortly before the latter's birth. In 1824 she became governess to Princess Victoria, and resided at Kensington Palace with the Duchess; and in 1827 George IV, as King of Hanover, conferred on her the rank of a Hanoverian Baroness. When the Duchess of Northumberland was appointed Victoria's official governess in 1830, Lehzen remained on as Lady in Attendance. (In 1842 she returned to Germany, and died in Bückeburg in 1870. The reasons for her departure were never made public, though it was generally accepted that she was *persona non grata* with the Prince Consort.) She and Lady Flora had quickly developed a mutual antipathy. The daughter of an obscure Hanoverian pastor, certain of her habits were unusual, one being an uncontrollable passion for carraway seeds, which she used freely at all courses at the dinner table. The carraway seeds were specially imported from Germany in little cotton bags, and particularly did the Baroness prefer them to horse-radish sauce with roast beef—a most un-English custom! Lady Flora sniffed and made cutting asides; the Baroness, powerless in her subordinate position, nursed a silent revenge. When Victoria became Queen, Lehzen continued by her side, while the Duchess and Lady Flora were relegated to a separate wing of the Palace, and the breach widened daily. Lehzen now was free to use her undisputed influence against the Duchess's suite, and Lady Flora's indisposition was a heaven-sent opportunity. When the rumours arose, the Baroness "was not at all surprised", and one can well imagine her strong support of the two principal accusers—the Whig Ladies Tavistock and Portman—in their application to the Queen for a medical examination in the hope that her scornful enemy would be dismissed from the Palace for ever.

Lady Flora was not long in writing to her family about her triumphant escape from a wicked conspiracy engineered by a certain foreign woman (that is, the Baroness Lehzen). She invited her correspondents to tell it "right and left". Her brother hastened to London with the intention of calling Melbourne out to a duel, but was soon satis-

fied that Melbourne had little to do with the case. Lady Flora's mother addressed a threatening letter to the Queen; it was, as far as can be gathered, the only time in her long life that Her Majesty ever received such a communication! Melbourne administered to the Dowager Lady Hastings a letter of grave rebuke, pointing out that Her Majesty had seized the first opportunity of assuring Lady Flora of her conviction that a mistake had been made, and that she was still most anxious to do anything in her power to soothe the feelings of Lady Flora and her family. But neither common sense, common fairness, nor apparently the remonstrances of Melbourne and Wellington prevented Hastings from sending this and other correspondence to the newspapers. The Tory Press was not slow in taking up the matter, with digressions into the kindred and exciting topics of the purity of English womanhood, the influence of the Whigs on the young Queen, and the moral character of the male entourage. The Hastings family specially urged the dismissal of Sir James Clark, but Melbourne wisely refused to advise it, and he was backed up by the Duke of Wellington, who expressed the opinion that only after a public inquiry could Sir James be dismissed. Meanwhile, a controversy on the subject of Lady Flora was carried on for some weeks between *The Morning Post*, on behalf of the Tories, and *The Globe*, on behalf of the Whigs, and added considerable interest to the columns of these journals.

In July of the same year Lady Flora died, and the outcry started afresh. The mental torture of the past six months, it was averred, had rapidly hastened her death. Publications, such as the "Palace Martyr", and "A Voice from the Grave of Lady Flora Hastings", now took up the parable. "A Warning Letter to Baroness Lehzen" expressed surprise that "you, a low-born woman of most forbidding aspect", should occupy a confidential position about the Queen. A medical writer wrote a pamphlet called "The Court Doctor Dissected", impugning with ferocity Clark's treatment of the patient.

Who Was to Blame for This Scandal and its Far-Reaching Effects?

Apparently the very young and totally inexperienced Queen, aged only twenty, was not to blame. Under the influence of her older ladies, and particularly Lehzen, she had been persuaded that the action she had taken was essential to the reputation of her Court. It is certain that Sir James did not, at any time, behave with anything suggestive of brutal roughness to Lady Flora; his urgings of her to confess or to submit to a medical examination were Royal commands; he gave an opinion on the case to no one except the Prime Minister and the Queen's mother, and then only when pressed. By the time matters had reached a crisis, there certainly were grounds, both from the clinical aspect and from Lady Flora's demeanour, for his suspicions. Where he failed was his want of tact in handling Lady Flora. As soon as his own suspicions of pregnancy were aroused, he should have come to a decision by a clinical examination, but his approaches to this abdominal examination displayed a lamentable misunderstanding of feminine nature, at least in the early nineteenth century. If Sir James had contented himself with merely telling Lady Flora that she had better remain in bed until after his next visit, there would have been no need to ask for her permission to lay his hands upon her abdomen "with her stays off". There is a particularity about all this that would induce many young women, even of the present day, to decline the proposal. Surely it is an axiom that the gentler sex will suffer much to be silently done, that they will not submit to if talked about and put prominently before them in words. Then, if the waiting in bed manœuvre failed, he should have insisted, on learning from Melbourne the gravity of the situation, in calling in another opinion. Sir James's medical critics stated he would not suggest a second opinion, simply to avoid any other medical attendant being about the Court. His appointment as physician to Her Majesty, over the heads of better known London consultants, had naturally aroused deep professional jealousy, and here was an excellent opportunity to ventilate it. Many of his colleagues, if they did not positively rejoice in his misfortune, at least felt no such sympathy for him as his case should undoubtedly have excited.

A Post Mortem Examination.

An autopsy was performed on July 5, 1839, but I cannot ascertain by whom.

There was great emaciation of the whole person.

In the chest, the heart and lungs were in a perfectly healthy state; but there were extensive adhesions of the pleura (or membrane covering the right lung) to that which lines the ribs, evidently of long standing.

In the abdomen there were universal adhesions of the peritoneum (or membrane which lines the cavity and covers the viscera), so that it could not be said that there was a single organ which was not, at every point on its surface, intimately connected with the parts in the vicinity. The liver was very much enlarged, extending downwards as low as the pelvis, and upwards so as very materially to diminish the capacity of the right cavity of the chest. The gall-bladder contained a small quantity of bile. The liver was of a very pale colour, but its structure was not materially different from that which exists in the healthy state. The stomach and intestines were distended with air; their coats, especially the muscular, were very much attenuated. The spleen and pancreas were free from disease. Some of the mesenetric glands were enlarged. There were a few small deposits of unorganized yellow matter, apparently in the substance of the adhesions.

The uterus and its appendages presented the usual appearances of the healthy virgin state.

From the character of the adhesions, so the report ran, it was plain that they could be referred only to inflammation at some former and distant period of time. The effect of them must have been to interrupt the passage of the contents of the stomach and intestines, and in various ways to interfere with the due performance of their functions. No diagnosis of the disease from which Lady Flora died is stated in this *post mortem* report, but I have sub-

mitted it to Professor MacCallum and Dr. Edgar King, and they both suggest that the condition was tuberculous peritonitis, with fatty degeneration of the liver.

One or two other points of interest with regard to medical diagnosis were raised against Sir James. Lady Flora's correspondence contains a statement that the size of her abdomen appreciably diminished during the time that elapsed between her first consultation with Sir James and the medical examination. If this were so, it was weighty evidence against the existence of pregnancy, but Sir James maintained that Lady Flora had not communicated this important fact to him, and that he himself did not notice it. This is not to be wondered at—stays obscure many things. Much was also made of the fact that the autopsy revealed the liver to be greatly enlarged, both upwards and downwards. Even a nautical man, Clark's critics claimed, should have known that pregnancy did not commence in the upper abdomen. But Professor MacCallum and Dr. King suggest that this enlargement was a fatty degeneration occurring as a terminal stage of the wasting disease, and was probably not the cause of the abdominal swelling of which Lady Flora at first complained, which was more likely abdominal distension due to mild intestinal obstruction associated with the massive peritoneal adhesions. This man Clark, the critics said, is or was a nautical surgeon. It was natural that he should be ignorant of diseases of women. Experience with sailors develops little obstetrical acumen.

However, *The Lancet* of July 13, 1839, in publishing and commenting on the result of the *post mortem* examination, defended Clark thus:

> Lady Flora died of a long-standing disease of the liver, and the publication of the *post mortem* report is the best reply that could have been given to the slanderers of an illustrious personage and of a distinguished physician. No mental emotion could have produced or even considerably accelerated the progress of the disease from which Lady F. Hastings died, and if the symptomatic swelling of the abdomen were by some mistaken for pregnancy, it could not have been by one who knew that in pregnancy the swelling is developed from below upwards.

The character of this comment suggests that it had its probable inspiration from Court circles.

The anxiety of this affair almost killed Clark. The effect on his practice was immediate. He lost no friends, but he made no new connexions, and it was years before the effect passed off and people realized that he had been made a scape-goat for feminine scandalmongers. But in the long years that followed, the Queen never wavered in her confidence and her friendship.

The Illness and Death of the Prince Consort.

Twenty-two years were to elapse before Sir James's reputation as a medical man was again to provoke a nation-wide interest, and the embers of the sad affair of 1839 were to be fanned into flame. This arose from the illness and death of Albert, the Prince Consort. In this year of 1861, Clark was seventy-three years of age.

Thus Lytton Strachey ("Queen Victoria", Chapter 6, paragraph 3):

> Before the year of 1861 was out, a terrible blow was to fall upon the Queen. Albert, who had for a long time been suffering from sleeplessness, went on a cold and drenching day towards the end of November, to inspect the buildings for the new Military Academy at Sandhurst. On his return, it was clear that the fatigue and exposure to which he had been subjected, had seriously affected his health. He was attacked by rheumatism, his sleeplessness continued and he complained he felt thoroughly unwell. Three days later, a painful duty obliged him to visit Cambridge. The Prince of Wales, who had been placed at that University in the previous year, was behaving in such a manner that a parental admonition had become necessary. The disappointed father, suffering in mind and body, carried through his task; but on his return to Windsor he caught a fatal chill. During the next week he gradually became weaker and more miserable. He sank and sank. Nevertheless, if his case had been properly understood and skilfully treated from the first, he might conceivably have been saved, but the doctors failed to diagnose his symptoms, and it is noteworthy that his principal physician was Sir James Clark. When it was suggested that other advice should be taken, Sir James poohed-poohed the idea: "There was no cause for alarm", he said. At last, after a letter of fierce remonstrance from Palmerston, Dr. Watson was sent for; and Dr. Watson saw at once that he had come too late. The Prince was in the grip of typhoid fever. "I think that everything so far is satisfactory", said Sir James Clark!
>
> Victoria's distress and agitation were great, but she was not seriously frightened. She declined to see Dr. Watson. Why should she? Had not Sir James assured her that all was well? Albert died on December 14.

To his description, Strachey adds a footnote which is an extract from a letter written by the Earl of Clarendon:

> One cannot speak with certainty, but it is horrible to think that such a life may have been sacrificed to Dr. J. Clark's selfish jealousy of every member of his profession.

This time Strachey's pen has treated Clark cruelly and very unfairly.

Examination of the available facts shows that there is not the slightest justification for any innuendoes being directed at Clark in this case. Albert died of hypostatic pneumonia at the end of the third week of his typhoid fever. Our senior colleagues well know what a particularly difficult condition to diagnose in its early stages was typhoid in the days before Widal tests and blood cultures. As a matter of fact Sir James exhibited considerable clinical acumen in the case by calling in, some days after Albert took to bed with bronchitis, the most eminent authority in England on typhoid fever, Sir William Jenner, who, in 1847, had demonstrated the essential distinction between the two diseases of typhoid and typhus fever. Prior to that date they were believed to be different manifestations of the same disease. Jenner remained in constant attendance on the Prince Consort until his death.

We know that Clark and Jenner early recognized the gravity of the disease and its probable outcome. They repeatedly urged the Queen to obtain additional advice, but this she emphatically refused to do until three days before the end, partly from her unbounded confidence in her advisers and partly from the fear of increasing, by alarms and indica-

tions of increasing danger, Albert's natural despondency. But the Queen had little to reproach herself for, because even if Sir Henry Holland and Dr. Watson had been called in earlier, they could have done nothing more.

Unfortunately no official bulletins were issued until the last week, and these were meagre and unsatisfactory. But here again we know that Victoria personally exercised the strictest censorship on these statements, actually erasing with her own hand essential phrases which would have allowed the public to realize much earlier than they did how seriously ill was the Prince. The credulity of the public in things medical was not to desert them on this occasion. A current rumour had it that the Prince had been poisoned by a Russian spy. It was a strange coincidence that his cousin, the King of Portugal—another scion of the House of Coburg—had just previously died of the same disease, typhoid fever, and poisoning was credited with this death also.

An agitation was started, born in the lay and in the medical Press, for an investigation into the Prince's death, but of this Victoria would not hear. Grief-stricken though the Queen was, never the slightest word of reproach did she level at Sir James Clark; he was still one of her oldest and best friends. The effect on the Queen and on the national life is too well known to be recapitulated here. For a time her reason was in jeopardy; she retired into semi-seclusion, from which she did not emerge for twenty-five years, and during which her popularity greatly waned.

What would have been the effect on British foreign policy had Albert lived can only be conjectured, but it must have been considerable. So great was his influence over Victoria that at the time of his death he was virtually King of England, growing stronger in influence every year. As he grew older, his knowledge and his intellectuality must have had an enormous influence on English governments.

Victoria presented Clark, for the use during his life, with one of her own estates, Bagshot Park, near Aldershot, and here he died in 1870, at the age of eighty-two, after a severe hæmatemesis.

Clark remained throughout his life an unspoilt, unostentatious Scottish gentleman. Lytton Strachey, that master of post-war biography, has made amends for his caustic pen by insuring that the name of Sir James Clark will not be forgotten for many a long day.

ON THE INHIBITION OF MITOTIC ACTIVITY BY X RADIATIONS OF DIFFERENT QUALITIES.

By WM. H. LOVE, B.Sc., Ph.D.
(Department of Cancer Research, University of Sydney.)

EXPERIMENTS have been performed, in order to investigate the possible significance of radiation quality, in the quantitative determination of mitotic inhibition in irradiated tissue cultures.

Material and Method.

The material used throughout the present work was derived from the heart of fowl embryos, grown in fowl plasma and chicken extract, by the classical hanging drop technique. Precise details of this technique have been published.[1]

For each determination a number of cultures were selected,[1][2] half of which were exposed to a dose of 100 *r* units, delivered in fifteen minutes by a heterogeneous beam of X rays filtered by two millimetres of aluminium. The cultures were maintained at a temperature of 38° C. during irradiation, and both sets were then returned to the incubator for a period of eighty minutes before being fixed and stained. The number of dividing cells in the irradiated specimens was then counted and expressed as a percentage of that found in the controls. This ratio is referred to as the mitotic survival.

Similar experiments were then performed in which a substantial variation in the quality of the incident radiation was produced by altering the excitation potential on the tube. In order, however, to avoid the introduction of effects associated with variation in the time factor,[1] it is desirable to arrange the conditions in such a way as to provide for the delivery of the same dose (100 *r* units) in the same time (fifteen minutes). This can be done by altering either the one or both of the following: (*a*) the current through the tube, (*b*) the distance of the cultures from the source of radiation; in this way it is possible to obtain a series of results exclusively indicative of the significance of the radiation quality.

It is also of first importance to ascertain that the conditions of experiment are such as to insure adequate biological sensitivity; that is, it is necessary to work on the sloping portion and not on the flat portion of the curve relating dosage and biological effects.[3] Failure to comply with this condition may lead to an erroneous interpretation of the results.

The dose of radiation administered to the cultures was measured by a free air chamber of the guarded field type,[4] and the inverse square law was applied in order to determine the intensity of the radiation in the position occupied by the cultures. The operation of the law of inverse square under the conditions of these experiments was investigated and found to be valid to within 2%, a figure which is well within the limit of error due to biological variation.

In establishing the mitotic survival for any one set of conditions eight cultures were employed, four in the irradiated group and four in the corresponding control group, each irradiated group being separately controlled as previously described.[1]

Results.

Four complete experimental surveys were made and the results of a typical experiment are set out in the following table.

*Table showing Results.**

Potential difference on tube, in kilovolts†	100	125	150	175
Number of cells in mitosis in control group	153	147	134	151
Number of cells in mitosis in irradiated group	81	84	72	78
Mitotic survival	53%	57%	54%	52%

* Dose of radiation administered was 100 *r* units. The time in which dose was administered, 15 minutes. The filtration of radiation was two millimetres of aluminium in each experiment, to eliminate the softer components of radiation.

† Measured by spark-gap, between ten centimetre spheres, and corrected for temperature and pressure.

Conclusion.

Within the limits of experimental error, and under the conditions of this experiment, the quantitative biological reaction, as measured by the inhibition of mitotic activity in tissue cultures, is independent of the penetration of the radiation over the range of 100 kilovolts to 175 kilovolts.

References.

(1) William H. Love: "Some Effects of X-Radiation on Dividing Cells in Tissue Cultures", *Archiv für experimentelle Zellforschung*, Volume XI, 1931, page 435; "The Occurrence of Mitosis in Tissue Cultures", *ibidem*, Volume X, 1931, page 442.
(2) F. G. Spear: "The Biological Response to Gamma Rays of Radium as a Function of the Intensity of Radiation", *The British Journal of Radiology*, Volume VI, New Series, 1933, page 387.
(3) William H. Love: *"Diminution du nombre des mitoses du sarcome de Jensen provoquée par les rayons-X"*, *Comptes rendus des séances de la Société de Biologie*, Volume CVII, 1931, page 1042.
(4) William H. Love: "On the Measurement of X Ray Dosage", *The Journal of the Cancer Research Committee of the University of Sydney*, Volume V, 1934, page 208.

Reviews.

THE HUMAN CONSTITUTION.

"THE CONSTITUTION AND ITS REACTION IN HEALTH", by Dr. T. E. Hammond, is a work which is full of interest.[1] The subject matter is simply worded and easy to understand, and is expressed in a convincing and methodical manner.

The book deals with an important phase of health and gives to physicians much food for thought that will enable them to deal more satisfactorily with problems confronting them in the solution of many factors leading to chronic ill-health. It contains an admirable chapter on "The Constitution", on the lines of ideas already presented by such well known authorities many years ago as Sir Archibald Garrod, and more recently by Dr. A. F. Hurst, Dr. J. A. Ryle and Dr. Draper, of New York, who have never failed to stress the importance of certain types of individuals, comprising those factors of the mind and of the body that a man derives from heredity and upbringing, being especially prone to certain kinds of disease.

While in no way undervaluing the great importance of fresh air, exercise and physique, Dr. Hammond discusses in an impartial and logical manner the possibility of over-emphasizing these, with consequent reaction on the constitution as age advances. He points out that much that is attributed to fresh air is very often really due to a change in the temperature, to certain atmospheric conditions, or to the season of the year. He also stresses the dangers of over-exposure to the sun. He might have added with much effect the very real dangers of rodent ulcer and cancer of the skin supervening in people exposed to the sun under conditions such as exist in countries like Australia.

In the chapter on "Food" the author points out the importance of the personal equation of the patient, which is all-important in the present endeavour to make dietetics a science, and that the constitution of the patient does not receive full consideration without detracting from the value of laying down standard diets for the treatment of diseased states.

The chapter on "The Asthenic State and its Treatment" is very well done and will be most useful for practical reference.

The author is to be congratulated on this production, which deals with a subject that is not sufficiently stressed.

[1] "The Constitution and its Reaction in Health", by T. E. Hammond, F.R.C.S.; 1934. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 169. Price: 7s. 6d. net.

A MANUAL OF ANATOMY.

THE appearance of a third edition of "A Synopsis of Regional Anatomy", by Professor T. B. Johnston, is an indication that the book is fulfilling a definite want.[1] That more formal text books and dissecting manuals should assume formidable proportions is inevitable, on account of the inclusion of much detail and on account of unavoidable repetition and overlapping. However, the student will be relieved to note that the essentials of his subject can be covered in this small book of 440 pages, including neurology, osteology and small paragraphs on embryology. The chief use of the book must be in revision by a student who has already carried out dissections.

There are no illustrations (except a few diagrams included in the section on neurology) and the book must be read in conjunction with a good atlas or with a dissected part and the corresponding bones.

Throughout the book there is used a revised terminology recently approved by the Anatomical Society of Great Britain and Ireland. The "B.N.A." terminology now takes its turn in brackets. It will please the student of yesterday to note that some of his "old terminology" has been reinstated and is now the very latest. The second cervical vertebra again becomes the axis with an odontoid process, the radio-distal bones of the carpus again become trapezium and trapezoid; and so on. Many of the changes will prove very welcome to teacher and student alike; for example, "middle gluteal line", "synovial bursa", "medial and lateral arcuate ligaments", "nerve to the rhomboids", "nerve to the *serratus anterior*", "nerve to the *latissimus dorsi*", "inferior and superior hemiazygos veins", "suprascapular artery" *et cetera*. The "submaxillary" gland and duct and lymph glands bid farewell to their ancestral inferior maxilla and take their proper place as "submandibular" gland and duct and lymph glands. Why the "superior and inferior apertures of the thorax" should have become the "thoracic inlet and outlet" is difficult to imagine, unless the Anatomical Society, at the time of its deliberations, was dominated by the passage of food.

The book can be well recommended to the student who likes to have the essentials of his subject encompassed in a book of small dimensions.

[1] "A Synopsis of Regional Anatomy", by T. B. Johnston, M.B., Ch.B.; Third Edition; 1934. London: J. and A. Churchill. Demy 8vo., pp. 483. Price: 12s. 6d. net.

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CANCER OF THE RECTUM: ITS EARLY DIAGNOSIS.

CANCER of the rectum is one of the most insidious forms of cancer. It occurs somewhat more commonly in men than in women and is found chiefly in persons between the ages of forty-five and sixty-five years. All experienced surgeons agree that when operation is undertaken in the early stages the chance of cure is considerable and the operative risk is relatively small. Charles Gordon-Watson in 1933 published some interesting figures in this connexion. Of fifty-two patients operated on at Saint Mark's Hospital, London, during 1928, thirty-seven had no lymphatic invasion; twenty-eight of these were alive after three years. Of fifteen in whom lymphatic invasion was present, only one was alive after three years. The majority of cancers of the rectum, however, are not detected in the early stages. Victor Hurley, writing in this journal a year or two ago, pointed out that 50% of carcinomata of the large intestine were beyond operative removal when the diagnosis was made or when laparotomy was undertaken. Other writers, such as Lockhart-Mummery, make similar or more damning statements in regard to cancer of the rectum—and cancer of the rectum can as a rule be discovered with the greatest ease by a simple digital examination. Ewing writes that it is a common experience that from 60% to 70% of patients with cancer of the rectum are treated for weeks or months for piles or catarrh or other vague benign conditions, and that a competent rectal examination is delayed or omitted. The conclusion is forced upon us that cancer of the rectum offers a standing reproach to the medical profession.

In looking for ways and means of removing this reproach, we must admit that in a small percentage of cases cancer of the rectum produces very little disturbance until it is well advanced. Bland Sutton, in his well known book on tumours, refers to *post mortem* examinations in which nodules have been found in the lung displaying the typical columnar epithelium of the colon. In these instances the rectum, omitted from the first examination of the body, was examined and cancer unsuspected during life has been found. Cases of this kind are, of course, exceedingly rare, and they may be omitted from our present discussion. The aspects that may be considered include the appearance of the growth, its site, and the symptoms that it produces. Rectal cancer, to quote Bland Sutton, consists of "glandular recesses lined with tall columnar cells embedded in a dense stroma of connective tissue". Colloid degeneration often takes place, and the proportion of glandular tissue may vary considerably. Macroscopically, carcinoma of the rectum may be divided into papilliferous and adenoid types. The papilliferous type may be recognized as a friable, fungating mass projecting into the lumen of the bowel; in appearance it is like a simple papilloma, but, unlike the simple papilloma, it has a base which projects its epithelial elements into the *muscularis mucosæ*. Incidentally, this form is not so malignant as the adenoid form. The adenoid form is the commoner form and appears as a sessile tumour involving the mucosa and submucosa. This type of tumour infiltrates the muscular layers of

the bowel at an early date and tends to encircle the bowel. Necrosis of the centre of the tumour leads to the formation of an ulcer, and the infiltration of the bowel results in the formation of raised indurated margins. Such are the formations that may be encountered by the examining finger and that may be inspected by the aid of the proctoscope. The growth may be found in any part of the rectum, but its favourite sites are the anal canal, the middle of the ampulla, and the junction of the rectum and pelvic colon. At the first two sites it may be palpated by the examining finger; when the growth occurs at the third mentioned site the examining finger will not be able to reach it. The discriminating observer, however, will note certain suggestive signs, such as ballooning of the rectum, atony of its walls and so forth, that will make him undertake a proctoscopic or sigmoidoscopic examination. Ideally a malignant growth will be discovered before the tumour has advanced to any considerable size; this will happen only if attention is paid to what may seem to be trifling symptoms—disordered bowel action, slight attacks of bleeding, the passage of mucus, a feeling of incomplete emptying of the bowel after passage of a stool, and so on. A diagnosis should be made long before the occurrence of such advanced signs as emaciation, anæmia, enlargement of the liver, the involvement of glands in the groin, and others that are mentioned in text books. It may be objected that the patient does not always present himself while his symptoms are slight. This is quite true, but it forms part of the story that must be left for another occasion. The present message is one of watchfulness and care. A patient who is slightly short of breath, who complains of unusual sensations in his chest, has his pulse examined; on the slightest suspicion of cardiac dysfunction the pulse is studied with meticulous care. Examination of the rectum should stand in the same relation to abdominal symptoms as examination of the pulse does to chest symptoms. If examination of the rectum were made part of the routine examination of the abdomen, fewer cancers of the rectum would be missed in the early stages and the reproach to the medical profession for late diagnosis would be removed.

Current Comment.

ANTIDOTES IN CYANIDE POISONING.

SINCE the general adoption of hydrocyanic acid for the fumigation of ships and buildings there have been a number of fatal accidents from this poison. The direction of public attention to the risks of a poisonous substance such as potassium cyanide, though a necessary warning, tends also to suggest its use to would-be suicides. In America there were 243 deaths recorded as due to cyanides in the registration area of the United States in 1931, whereas the highest previous figure for any year was about 130. K, K. Chen, C. L. Rose and G. H. A. Clowes quote these figures in a review of the various antidotes for cyanide poisoning, pointing out the great importance of establishing the best emergency treatment.[1] One of the most recently introduced antidotes is methylene blue, and in the last two years a considerable bulk of work has been produced in connexion with this substance. Its efficacy lies in the fact that it transforms the hæmoglobin of the blood to methæmoglobin, which combines with the cyanogen ion to form cyanmethæmoglobin, a much less toxic compound.

Chen, Rose and Clowes, working in the Lilly Research Laboratories, set out to evaluate this remedy by the experimental method, but they have ended by producing a more comprehensive review of the treatment of cyanide poisoning in general. In using dogs as the subjects of experiment, it was found that the size of the animal permitted some idea of comparison with the human being, and it was found possible to allow the animals to proceed to the later stages of poisoning, when respiratory failure had occurred, and yet to rescue them by the use of an efficient antidote. The chief substances tested were methylene blue, sulphur compounds, such as sodium thiosulphate, and the nitrites. The sodium thiosulphate was used in 50% solution and was not found to cause any irritation on intravenous injection. It will be remembered that Bolliger and others, working in Sydney, have also shown the very low degree of toxicity of this substance. An interesting comparison was made of the effects of the thiosulphate and a nitrite such as sodium nitrite. The latter is rapid in action and an appropriate dose would put a poisoned dog on his feet promptly, whereas the action of the thiosulphate was considerably delayed. Another feature of the experiments which is of great practical importance is that after remission of toxic symptoms there may be a return of the signs of poisoning again, hence continuation of treatment is necessary. It must be remembered, however, that drugs such as the nitrites are not free from toxic effects, and too great an accumulation may cause asphyxia. Methylene blue, in spite of its recent leap to fame, proved to be the least effective of the remedies tried, and,

[1] *The American Journal of the Medical Sciences*, December, 1934.

indeed, in dogs the combination of amyl nitrite and sodium nitrite was found to be more valuable than methylene blue alone. Still more important is the synergic power of the nitrites and thiosulphate when given together. The nitrites apparently act by reacting with the hæmoglobin, but no detailed research was carried out on this point, and it is believed that the thiosulphate converts the cyanide to sulphocyanate. As sodium thiosulphate is readily eliminated from the body, it is easy to understand why it is necessary to maintain a necessary supply, as otherwise toxic symptoms may recur.

To put the conclusions of these authors to practical use, it must, of course, first be realized that the outlook in any case will depend upon the dose of poison and the promptness with which treatment is begun. Of particular importance is this latter, on account of the great volatility of the cyanide in gas form. The routine suggested is as follows: immediate administration of amyl nitrite by inhalation; intravenous injection of sodium nitrite followed by sodium thiosulphate; gastric lavage if the poison has been taken by mouth; and continuous observation of the patient for twenty-four to forty-eight hours, with repetition of the antidotes after one hour if the symptoms threaten to return. In any case it would appear wise to give a second series of injections after two hours for prophylactic purposes. The doses suggested by these authors are six to ten milligrammes of sodium nitrite and 0·5 gramme of sodium thiosulphate per kilogram of body weight; half doses are used for repeated administration. It is important that the two substances should not be mixed in the syringe. It will be understood that this combination has yet to be tested fully in clinical trials, but the simplicity and the ready availability of the remedies should commend them to all those who are likely to meet with this form of poisoning. It may be remarked that in hydrocyanic acid gas we have a most poisonous and rapidly acting substance and, if anything is to be done when an emergency arises through its use, it must be done quickly. Therefore amyl nitrite suggests itself as an appropriate emergency antidote; it is easily carried in capsules and is easily administered, even by unskilled persons, while other measures are being taken.

MOLLUSCUM CONTAGIOSUM.

MOLLUSCUM CONTAGIOSUM is not a common disease, in Australia at any rate; it appears to be commoner in certain European countries. It is important for two reasons: first, that the lesions most frequently occur on the face; secondly, that it is contagious. In tropical countries it is by no means rare, and probably occurs much more frequently there than most medical practitioners believe. Where great numbers of sick natives have to be attended to, examination is often necessarily cursory, and the lesions of *molluscum contagiosum* may readily be mistaken for the secondary lesions of frambœsia. This mistake is all the more likely to occur because of the common site of the nodules—the face. In the tropics, then, there is a third reason for the importance of the disease. In New Guinea much of the treatment for frambœsia is carried out in the field; the medical officer or medical assistant administers injections of one of the arsphenamine group of drugs and perhaps does not see his patients again for many months. Under such conditions, even if all the cases of *molluscum contagiosum* were recognized, the difficulties in the way of applying treatment would be very great, if there were no more effective method than those at present available. A preliminary note on a new method of treating *molluscum contagiosum* has recently been published by L. M. Ghosh.[1] Ghosh points out that Wile and Kingrey showed in 1919 that the disease was caused by a filter-passing virus; most authorities accept their views. Wile and Kingrey have also shown that the material expressed from a nodule contains the virus, which reproduces the disease when man is inoculated with it. Ghosh states: "Infection in man is probably by direct contact and also from infected baths or clothing." The disease is said to be self-limiting; but it persists for six months or more, and during this time may lead to the infection of many persons.

Ghosh conceived the idea of making a vaccine from nodules of *molluscum contagiosum* and applying it therapeutically. This he did, with encouraging results. Two or three nodules are cut off with scissors. Sterile saline solution, in the proportion of one cubic centimetre per milligramme of nodule, is made ready. The nodules are then ground down in a sterile mortar with powdered pumice stone or fine sand, the saline solution being added little by little. The emulsion is filtered, first through "Krysolgar", then through a fine Chamberland candle. The filtrate is incubated for twenty-four hours and tested for sterility. Before use, two cubic centimetres of the stock vaccine are diluted in eight cubic centimetres of normal saline solution containing 0·2% commercial formalin to kill the virus. Ghosh remarks that, as the injection of formaldehyde causes pain, he intends to try phenol in his next series of cases.

The vaccine is injected intradermally every three or four days, the dose being 0·1 or 0·2 cubic centimetre for the first injection, and being increased by 0·1 or 0·2 cubic centimetre at each succeeding injection. Five or six injections only are required to effect a cure. There is no local or general reaction nor any contraindication. As a result of this method of treatment the nodules shrink and drop off. Ghosh briefly describes six cases.

This is one of the innumerable little advances surrounding the many great ones that have resulted from research in India. Apart from its immediate importance, it may be of value in stimulating the study of some other skin diseases along similar lines.

[1] *The Indian Medical Gazette*, November, 1934.

Abstracts from Current Medical Literature.

MEDICINE.

The Sputum in Pulmonary Asbestosis.

R. C. PAGE (*The American Journal of the Medical Sciences*, January, 1935) has made a study of the sputum in thirty-eight cases of pulmonary asbestosis. Twenty-one patients were males and seventeen were females. The average duration of exposure was fifteen years, the range being one to fifty years. Tuberculosis was present in eight cases; in this group the average period of exposure was 9·2 years, in the non-tuberculous group it was sixteen years. Asbestos bodies were present in every case but one. Asbestos bodies are formed in the lung alveoli by the deposition around individual asbestos fibres of an iron-containing silica gel, derived partly from the fibre and partly from the surrounding fluids. The author concludes that the presence of asbestos bodies in the sputum merely indicates exposure to asbestos dust. If they are large, it means that a long interval has elapsed since the onset of exposure. The number of asbestos bodies is insignificant, but old and weathered bodies suggest a definite pathological process. Clumps are evidence of lung disintegration, but their absence does not exclude disintegration. Elastic fibres probably indicate rapid lung destruction. Elastic fibres may be present in the sputum in pure pulmonary asbestosis both with and without clumps, or in asbestosis with associated tuberculosis. The author holds that the routine examination of the sputum in cases of suspected pulmonary asbestosis is essential, as it is an important aid to diagnosis.

Gonococcal Arthritis.

To aid in the diagnosis of gonococcal arthritis, C. S. Keefer and W. K. Myers (*Annals of Internal Medicine*, November, 1934) made a clinical study of a series of sixty-nine cases which they have observed during the last three years. An appreciation of the histological changes in the synovial membrane in these cases is helpful in understanding the variations in the clinical picture and course of the disease as far as the joints are concerned. When pain, periarticular swelling and exudation of non-infected synovial fluid into the joint cavity are present, the pathological process is confined for the most part to the synovial connective tissues where there are collections of neutrophile cells, lymphocytes and plasma cells. The surface cells of the synovial membrane are intact, and it is usually impossible to cultivate the gonococci from the synovial fluid. In other cases, in which there is extensive inflammation of the synovial membrane and connective tissues, the joint fluid contains numerous cells and organisms. There may be destruction of the underlying bone and cartilage with resulting fibrous or bony ankylosis. The rapid destruction of the cartilage and bone is a feature of gonococcal arthritis and is of value in differential diagnosis. The following points were used as the criteria for the diagnosis: a history of a recent or previous gonococcal infection of the genito-urinary tract; the presence of a localized gonococcal infection, as proved by symptoms, signs and bacteriological examination; the presence of gonococci in the synovial fluid, or a positive gonococcal complement fixation test in the blood serum or synovial fluid. The age of the patients varied from 18 to 70 years, 83% of patients being males. Arthritis may appear at any time after the onset of gonorrhœa, commonly after reinfection, rarely after the local lesion has disappeared. Recurrent attacks of arthritis are common with reinfection with the gonococcus. Pain in one or more joints was the first symptom, either in the small joints of the hand or in the larger joints. Dull and aching in character, the pain was worse on movement and was followed by swelling and redness, the degree of swelling varying greatly. Repeated aspiration of the affected joints was sometimes necessary. Very often there was localized tenderness of the joint as well as marked muscular atrophy in all cases. Sixty patients in this series had a polyarthritis; in the remaining nine it was monarticular. Knees, ankles and wrists were the joints most frequently involved, as well as the metacarpophalangeal and metatarso-phalangeal joints. An associated tenosynovitis was frequently noted, and in some instances it completely dominated the clinical picture. The presence of other lesions suggestive of a gonococcal ætiology, such as bilateral conjunctivitis, perichondritis, iritis, is of help in diagnosis. Other diagnostic features in the examination of the blood serum and synovial fluid are discussed. The prognosis is usually not very good; only 37% of this series of patients recovered completely without any signs of joint disease. The main determining factors in the ultimate outcome are: severity of infection and reaction in the synovial cavities, persistence of local infection, reinfection. Illustrative case histories are given.

A Kidney Function Test.

E. J. STIEGLITZ AND A. A. KNIGHT (*The Journal of the American Medical Association*, December 8, 1934) describe a test for renal glomerular efficiency by the intravenous injection of sodium ferrocyanide. This drug is eliminated by the glomeruli alone. It must be very carefully prepared. The anhydrous salt of sodium ferrocyanide, 0·25 gramme, was dissolved in 10·0 cubic centimetres of sterile distilled water and slowly injected into a vein. Specimens of urine were collected 30, 120 and 180 minutes after the injection. Titration was carried out with a quantitative copper sulphate solution. Fifty normal persons were studied and a graph indicating the excretion was made. In hypertensive arterial disease (11 cases) without other evidence of renal damage the ferrocyanide output was conspicuously reduced. In eight cases of cardiac decompensation similar results were obtained. In 14 cases of nephritis, both acute and chronic, the excretion was either nil or very much reduced. The ferrocyanide test was compared with the phenolsulphonephthalein test and was found to be much more sensitive; it was also found to be non-toxic in the dose recommended, when given slowly into a vein. It is to be noted that potassium ferrocyanide is often toxic and that carelessly prepared sodium ferrocyanide may also give rise to dangerous after-effects.

Spontaneous Hypoglycæmia.

K. WOTZKA, assistant physician at the Allerheiligen Municipal Hospital, Breslau (*Münchener Medizinische Wochenschrift*, July 27, 1934), reports the following case. The patient was a man of fifty-three years, with no family history of disease, who had been perfectly well up to the age of fifty years. Since that date (1930) he had been "cardiac", subject to attacks of palpitation with severe sweating and shivering, vertigo and weakness. These attacks usually came on an hour after eating or after bodily exertion. He had found that the attacks could be improved or even cut short by sweetened drinks, and since this discovery had developed an intense craving for sweets (even apart from the attacks), which he had never experienced before 1930. Since June, 1933, increasing loss of appetite and antipathy to meat and sausage occurred. Two months after a short influenzal attack in October, 1933, the patient developed severe pains about the umbilicus, radiating to the left shoulder, with gradually increasing jaundice, pale, loose stools, and beer-coloured urine. From June, 1933, to January, 1934, when he was admitted to hospital, he lost 23·4 kilograms (fifty-two pounds) body weight. On his admission to hospital there was moderate jaundice, poor circulation in skin and mucous membrane, no œdema and cardiac dilatation; the systolic blood pressure was 130 and the diastolic pressure 70 millimetres of mercury; the liver was palpable two fingers' breadth below the costal margin. The clinical condition was parenchymatous hepatitis, and the history of the attacks suggested hypoglycæmia. This was confirmed by tests. In the first, after intravenous injection of 15 grammes of glucose the blood sugar rose from 54 to 129 in 15 minutes, then fell in successive quarter hours to 98, 60 and 46. In another test 30 grammes

of glucose were given by mouth at 8 a.m. and again at 8.45 a.m. The blood sugar rose from 100 (before any glucose was given) to 178 at 8.45, was 113 at 9.15, 182 at 9.45, then fell steadily to 48 at 10.45, at which time he had palpitation, sweating and faintness. With appropriate diet he had no further attacks after discharge from hospital.

Acute Monocytic Leuchæmia.

A DETAILED clinical report with autopsy findings of a case of acute monocytic leuchæmia is given by Julia Morgan and Y. T. Hsu (*Chinese Medical Journal*, November, 1934). A man of thirty-four years of age was admitted to hospital suffering from chronic pyorrhœa and Vincent's infection of the gums, with ulceration, fever and tachycardia. On the third day petechiæ appeared, subconjunctival hæmorrhages on the fourth, and gross hæmaturia on the fifth. There was a very mild degree of adenopathy, the liver and spleen being slightly enlarged and tender. Signs of peritonitis developed on the sixth day, a blood culture being positive for *Streptococcus viridans*. A very rapid increase in the white cell count under observation in a patient who, on two previous occasions, had given a normal total and differential white count is noted. Definite anæmia developed during the last two days, death occurring on the tenth day. On the patient's admission to hospital the total white count was 21,200, rising to 338,050 per cubic millimetre before death, with 97% to 99% of monocytes. There was a complete absence of polymorphonuclear leucocytes. Histologically, a generalized monocytic infiltration, slight or marked, was found in all the organs. Ulceration of the caecum was noted.

Spontaneous Arrest in Pulmonary Tuberculosis.

GEORGES DELORE (*La Presse Médicale*, August 4, 1934) protests that since collapse therapy has attained such popularity it is apt to be forgotten that spontaneous cure is not uncommon in pulmonary tuberculosis. He points out that many writers have recently shown that this can happen in the absence of any special method of treatment. Carefully controlled observations have demonstrated beyond all doubt that cavities can completely disappear, without even leaving scars. Again, the extensive lesions of epituberculosis, with their semblance of lobar pneumonia, may resolve entirely in a few weeks, the radiological picture showing finally nothing more than the minute primary lesion. Nodular infiltrations, even though widely disseminated and appearing to change very little radiologically over a period of months, gradually become more discrete and fibrous and may eventually merge indiscernibly into the pulmonary structure. In view of these various types of spontaneous regression and apparent cure in pulmonary tuberculosis, the author urges that the possibility of such an outcome should always be borne in mind by the physician when contemplating any form of collapse therapy.

Impedance Angle in Thyreotoxicosis.

THE electrical property of the body, known as the impedance angle, has been studied and measured by Brazier; and J. D. Robertson and A. T. Wilson (*The Lancet*, November 24, 1934) have undertaken a combined study of the basal metabolic rate and the impedance angle. The general conclusion from the original work was that the impedance angle forms a very reliable aid to the diagnosis of toxic conditions of the thyreoid gland, and is more specific and more certain than the basal metabolic rate. In the present investigation the following cases were studied: eight consecutive cases of typical Graves's disease, before and after iodine therapy; four consecutive cases of typical Graves's disease before subtotal thyreoidectomy and about fourteen days after; two case sof myxœdema before and after thyreoid extract therapy. In the first group the impedance angle was found to be outside the normal limits, but pre-operative iodine therapy caused no alteration, although there was clinical improvement and a fall in the basal metabolic rate. In the second group operation produced no change in the impedance angle, despite clinical and metabolic improvement. Thyreoid therapy in the third group had no effect on the impedance angle, which was normal before treatment was instituted. From these results it appears that determination of the impedance angle is of no value in assessing the clinical progress in cases of Graves's disease and myxœdema.

Blood Cholesterol and Creatinuria in Hypothyreoidism.

JULIUS H. HESS (*Annals of Internal Medicine*, November, 1934) points out the limitation of basal metabolic determinations in children, and particularly in those under the age of eight years. He suggests that the level of cholesterol in the blood and the excretion of creatine in the urine are useful as aids in early diagnosis and in gauging treatment with thyreoid medication in the thyreoid-deficient child. The normal blood cholesterol in children was checked by determinations in twenty-five individuals, ranging from two months to eleven years, and not suffering from any derangement of cholesterol metabolism. The average figure so determined was 190 milligrammes *per centum*. Twenty-four thyreoid-deficient children were investigated and found to have hypercholesterolæmia when not under treatment with thyreoid extract, the values ranging from 277 to 782 milligrammes *per centum*. These values fell to normal limits on the administration of thyreoid extract and a definite clinical improvement followed. In this report total blood cholesterol only is estimated; it is suggested that determination of the ratio of free cholesterol to the ester may give further valuable information in the diagnosis and treatment of hypothyreoidism. Normally, creatine is not found in the urine of the adult male; small amounts appear periodically in the urine of normal women; but creatinuria is physiological in all children before puberty. It is also known that creatine is excreted in the urine in all types of muscular dystrophy and increased endogenous protein metabolism. Extensive creatine and creatinine excretion studies were carried out on thirty-four children, including normal and diseased individuals. Detailed observations are reported on two cretins, and it was found that there was an absence of the physiological creatinuria of childhood when the patients were not receiving thyreoid therapy by mouth. Thyreoid feeding restores the hypothyreoid child to the condition of creatinuria characteristic of the normal child. The estimation of creatine is seen to be a very delicate index of the effect of the ingestion of thyreoid, inasmuch as it occurs before any definite change is noted in the basal metabolism and blood cholesterol. A probable explanation of the diminished creatine excretion is that it may be due to a low endogenous metabolism incidental to hypothyreoidism. The greater ease, simplicity and reliability of creatine analysis than of the basal metabolic rate in children seems to suggest that this measurement may serve as a useful guide in thyreoid medication.

The Cauterizing of Pleural Adhesions.

ALF GULLBRING (*Revue de la Tuberculose*, November, 1934) gives his results, during six years, in cauterizing adhesions in patients under artificial pneumothorax treatment for pulmonary tuberculosis. Four hundred and forty-two patients were treated with 531 cauterizations. In 370 cavitation was present. In 96% of the cases adhesions were freed sufficiently to obtain a complete collapse. Of 250 patients who had tubercle bacilli in their sputum before operation, 73% showed "negative" sputa within the following two weeks. Effusion occurred in ten, and empyema from mixed infection in two cases. Severe hæmorrhage followed in three cases and cardiac failure in one. In no case did perforation of the lung result. The author considers the indication for cauterization to be the presence of adhesions, suitable for this form of treatment, which are preventing the satisfactory collapse of the tuberculous lesion, irrespective of whether tubercle bacilli are present in the sputum or not, or whether there are any other signs of activity. With regard to technique, he prefers the galvanocautery to diathermy, he objects to the use of the one instrument for both vision and section, and he describes a new instrument, superior to other thoracoscopes, both in magnification and lighting.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE SOUTH AUSTRALIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Anatomy Theatre, University of Adelaide, on November 29, 1935, DR. E. BRITTEN-JONES, the Vice-President, in the chair.

Diabetes Complicated by Tuberculosis.

DR. D. R. W. COWAN read notes and demonstrated X ray films of two cases of diabetes complicated by pulmonary tuberculosis. In each case treatment for the diabetes had been conducted on modern lines by means of insulin with a balanced diet, and the tuberculosis by means of artificial pneumothorax and general care.

Dr. Cowan said that the first case, that of Mrs. E.T., was of historical interest in that she was the first patient treated in South Australia with insulin, which she still took regularly. About August, 1931, she developed a cough and expectoration, and the diagnosis was made clear when tubercle bacilli were found in the sputum and X ray examination revealed infiltration and cavitation in the left lung. It was thought wise to induce an artificial pneumothorax at once, and this was done without much trouble. The series of pictures of the chest showed well the stretching of an adhesion over the cavity, which finally became obliterated. The pneumothorax was continued for about two years, when the lung was allowed to expand. At the time of the meeting the patient seemed very well clinically and, to her great joy, had presented her husband with a normal, healthy child.

The second patient, Mrs. S.R., aged forty-one years, was admitted to the Adelaide Hospital in June, 1934. She had a fairly severe grade of diabetes and was very ill with marked toxæmia from the lung lesion. There were numerous tubercle bacilli in the sputum, there was a well marked evening rise of temperature which persisted for eight weeks, and X ray examination revealed an extensive lesion with cavitation in the left lung. An artificial pneumothorax was induced, but considerable difficulty was experienced in securing a good collapse, owing to an adhesion over the cavity. This gradually stretched, and as the lung collapsed the patient's condition improved, the toxæmia subsided, and the diabetes was well controlled with insulin and a balanced diet. An attempt to wean the patient off insulin had been unsuccessful.

Modern Treatment of Diabetes Mellitus.

DR. S. R. BURSTON read a paper entitled: "The Modern Treatment of Diabetes Mellitus" (see page 231).

DR. F. W. ARDEN remarked that Dr. Burston had mentioned the treatment of diabetes by rationing carbohydrate and allowing variation in the protein and fat intake, but had condemned it forthwith as likely to end disastrously. Dr. Arden asked why Dr. Burston showed such aversion to a treatment which presented the advantages: (i) of variation instead of monotony in diet, (ii) of freedom from a good deal of the care and fussiness otherwise required and which could be adequately controlled by regular observation of the patient's weight, blood sugar and urine.

Dr. Arden's reason for asking the question was that he had at present quite a number of middle-aged patients at the out-patient department being treated along those very lines, enjoying the new system and apparently doing fairly well.

Dr. Burston, in reply, confessed that he might have been over-hasty in his condemnation, but added that he thought the extreme ease of managing the diet would introduce an element of carelessness into the patient's behaviour, which would make it unsuitable for the unintelligent.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Bailey, Warwick Hector, M.B., 1933 (Univ. Sydney), Sydney Hospital, Sydney.

Crisp, Arthur Charles, M.B., B.S., 1933 (Univ. Sydney), Nepean Dam, Bargo.

Johnson, David William, M.B., B.S., 1933 (Univ. Sydney), Sydney Hospital, Sydney.

McLaren, Alexander Wright, M.B., 1932 (Univ. Sydney), c.o. Dr. Kirkwood, Epping.

Sofer Schreiber, Marcel, M.B., B.S., 1931 (Univ. Sydney), The Women's Hospital, Crown Street, Sydney.

Watt, John Langston, M.B., B.S., 1933 (Univ. Sydney), Tenterfield.

Wherrett, Reginald Ernest, M.B., 1933 (Univ. Sydney), 340, Marrickville Road, Marrickville.

The undermentioned has been elected a member of the Tasmanian Branch of the British Medical Association:

Tisdall, Henry Thomas, M.B., B.S., 1930 (Univ. Melbourne), Beaconsfield.

Congresses.

THE AUSTRALIAN AND NEW ZEALAND ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE twenty-second meeting of the Australian and New Zealand Association for the Advancement of Science was held in Melbourne from January 16 to 23, 1935, under the presidency of Sir Douglas Mawson, F.R.S.

The Sections.

The sections represented were: A, Mathematics, Physics and Astronomy; B, Chemistry; C, Geology; D, Zoology; E, History; F, Anthropology; G, Economics, Statistics and Social Science; H, Engineering and Architecture; I, Medical Science and National Health; J, Education, Psychology and Philosophy; K, Agriculture and Forestry; L, Veterinary Science; M, Botany; N, Physiology; O, Pharmaceutical Science; P, Geography and Oceanography.

Election of Office-Bearers.

At a meeting of the General Council of the Association held on January 16, Sir David Rivett was elected President for the next meeting, to be held in Auckland in 1937. An invitation to hold the 1939 meeting at Canberra was accepted.

Dr. A. B. Walkom was reelected Honorary General Secretary of the Association.

The Müller Medal.

The Müller Medal of the Association was awarded to Dr. R. J. Tillyard, F.R.S., for his researches on Australian insects, fossil and recent.

Reception of Delegates.

The Lord Mayor of Melbourne received delegates at the Town Hall during the morning of January 16. In the afternoon members of the Association were received by His Excellency the Governor of Victoria at a garden party at Government House.

President's Address.

Sir Douglas Mawson, F.R.S., the President, delivered his address at the Wilson Hall on "The Unveiling of Antarctica". He dealt with the history of the antarctic continent, from the speculations of the ancients and the voyages of the early navigators to the discoveries of the

recent British, Australian and American expeditions. The existence of an antarctic land mass of some four and a half million square miles had been definitely established. A good deal of the coast line of this continent had been mapped, but only a very small fraction of the area had been explored. The existence of an ice cap over the bulk of the land made geological investigation difficult, so that the mineral resources of the area were still problematical. The whale fisheries of the antarctic seas, however, had an annual value of £5,000,000 to £9,000,000. These seas were at present being vigorously exploited by the Norwegians. The area of the Australian Antarctic Dependency was about 2,280,000, and of the New Zealand Dependency about 175,000 square miles. Australians therefore had a considerable stake in this new land.

Public Lectures.

During the meeting public lectures were delivered by Dr. P. Marshall on "Volcanoes of the Pacific", and by Sir George Julius on "Unemployment".

Sir George Julius said that unemployment could not be regarded as a cyclic phenomenon, nor could it be expected to cure itself. It was largely due to the mechanization of industry, and a solution of the problem must be actively sought. Expansion in demand had not proceeded at the same rate as increase of productivity. The weak point of modern civilization was its insecurity, which forced attention too much to the materialistic aspects of life. The use of machinery in industry ought to enable the increased leisure provided to be devoted to the development of human character. It was essential that the economic system should be controlled, but there was danger of the control passing into inexpert hands. Some idea of the gravity of the problem was given by the estimate that, unless industry could expand, in New South Wales alone some 20,000 boys leaving school in one year would not be able to find work.

The Liversidge Memorial Lecture.

The Liversidge Memorial Lecture was delivered by Sir David Orme Masson, on "Crucial Advances in Chemical Theory During the Last Half Century". The lecturer traced the development of theories of the structure of the atom from the time of the periodic law and its forerunners to the most recent work on the isotopes of the elements and the light thrown one these by the theory of atomic numbers. He showed the important part played in this development by the discovery of the rare gases of the atmosphere, of X rays, and of radio-activity. Much of the advance in this last field had been made possible by the invention of the microbalance by two Melbourne men, the late Professor B. D. Steele and Professor Kerr Grant, now of Adelaide.

"Heavy Hydrogen" and "Heavy Water".

In Section A the newly discovered "heavy hydrogen" or diplogen and its compound with oxygen, "heavy water", were the subject of three papers: "The Efficiency of Separation of Diplogen and Hydrogen by Electrolysis", by Mr. I. H. Oddie; "The Thermal Conductivity of Hydrogen and Diplogen Mixtures", by Dr. W. G. Kannaluik; "The Spreading of 30 per cent. and 95 per cent. Concentrations of Heavy Water on the Surface of Mercury", by Mr. R. S. Burden. The experiments described in the last paper were carried out with samples of heavy water supplied by Dr. M. L. Oliphant, of the Cavendish Laboratory, Cambridge. Normal pure distilled water spreads slowly on the surface of mercury. The rate of spreading is determined by the presence of traces of ions and by the humidity of the atmosphere. It is accelerated by traces of acid and inhibited by traces of alkali. The heavy water spreads more rapidly than ordinary water, even in the presence of traces of alkali. As the experiments with the 95% heavy water had to be carried out with less than a drop of this at present costly material, this peculiar difference from ordinary water could not yet be considered to be definitely established.

Traffic Noises.

Mr. R. O. Cherry read a paper entitled "The Investigation of Traffic Noises". He said that noise was to some extent a relative term. A "quiet" city street would be objectionably noisy in a residential suburb. The maximum noise was not so important as the maximum level, say, for 5% of the total time. Noise became intolerable when it interfered with ordinary activities, such as conversation. City buildings could be made sound-proof, but the cost of construction would be prohibitive. Diminution of noise was more important. Recent experiments in London and New York had shown that city noises could be materially diminished by simple control of vehicular traffic. An important factor in city noises was tramway traffic. While metal wheels were used on metal tracks some noise was unavoidable. It was simple by means of suitable apparatus to pick out the vehicle responsible for any particular noise. Offenders could be detected.

Major E. H. Booth described experiments in progress in Sydney on the use of resilient ballast for tramway rails. By this means tramway noise could be considerably reduced. Defective gears on the tramway vehicles themselves were, however, also an important factor in the noise caused by them.

Atomic Physics.

In the course of a lecturette on "Recent Advances in Atomic Physics" Professor Kerr Grant mentioned that Italian investigators, by bombardment of various known atoms with neutrons, had succeeded in producing forty new varieties of atoms, all of which were radio-active. Although the quantities of these new atoms produced were minute, quantities of radio-sodium comparable with the quantities of radium used for medical purposes had already been made, and this discovery might have important practical applications.

The Learning and Practice of Chemistry.

The President of Section B, Professor J. C. Earl, spoke in his presidential address on the learning and practice of chemistry. He pointed out that education was among the most costly activities of the modern State. Public opinion required a nucleus upon which to crystallize. The opinion of the scientific section of the community could provide a suitable nucleus. The function of chemistry in secondary education was not to produce chemists, but useful citizens. The school should be more concerned with the intellectual development of the pupil than with the provision of information.

Biological science had made such progress during the last few years that it was now no longer entirely descriptive. A place for it in secondary education was now rightly demanded. This could be obtained only by some sacrifice in the time devoted to the "exact" sciences, physics and chemistry. This had been recognized in the proposal to include these subjects with biology in a course of "elementary science" in the curriculum.

In a matriculation requirement of five subjects three non-scientific and non-mathematical subjects were desirable. Many present-day students were quite unable to express simple ideas clearly in writing.

A defect in the present teaching of chemistry in schools was the artificial background used. Many of the substances studied were compounds never met with in ordinary life. Why should the compounds of carbon be almost completely banned in the teaching of elementary chemistry? Many of these were as simple as some of the inorganic compounds used to illustrate chemical phenomena, and bore a much more intimate relation to daily life. At present not enough time was given to the study of chemical phenomena in the laboratory, and of that time too great a proportion was given to the "detection" of various substances rather than to demonstration of fundamental chemical relationships.

In the later teaching of the student who was specializing in chemistry some mathematics and physics were essential. A preliminary study of biology or geology was desirable to broaden the view. A reading knowledge of French and German was now essential. Active reading should go hand in hand with laboratory work. For this, adequate

library facilities for the student were essential, a fact often disregarded. The graduate from a school of chemistry should enter his profession with the feeling that chemistry was a living, growing branch of knowledge.

Marine Zoology and Current Problems.

In his presidential address to Section D, Professor W. J. Dakin dealt with "Some Recent Researches in Marine Zoology and their Bearing on Current Problems". He emphasized the importance of a study of plankton as the ultimate source of sea life. He showed how the density of plankton increased as the temperature of the sea water decreased. The plentifulness of marine fauna ran parallel with that of plankton, and all the great fisheries of the world were to be found in the colder seas. Little was yet known, however, as to the causes of variation of density of plankton in time and place.

Speaking of biology in general, Professor Dakin said that the unique fauna entrusted to Australians had not yet been adequately investigated. A biological survey had been suggested, but anything of the kind should consist of a study and preservation of animals under their natural conditions, and not of their destruction to provide dead specimens for display and classification in museums.

Mention was made of the inadequate place given to biology in the school curricula in Australia.

Biology in School Education.

A discussion was held between Sections D, J and M on "The Place of Biology in School Education".

Professor W. J. Dakin said that both England and Australia lagged behind many other countries in the teaching of science in schools. "Science" often meant elementary physics and chemistry in boys' schools, or botany in girls' schools. A committee of the British Economic Advisory Council had reported that an adequate standard of intellectual equipment would not be attained until biology was recognized in the schools as a cultural subject, apart from its value to specialized biological services. No boy should leave school without some knowledge of biology, but it must not be regarded as merely another subject for examination.

Young people should not be left to gain sexual knowledge promiscuously. How many parents could or would do their duty in this respect? The teaching of biology offered an excellent way out of the difficulty. With the proper teaching of biology reproduction would fall naturally and inconspicuously into its place with other obviously normal functions of living things.

Miss D. Ross said that the teaching of biology must begin early. Then instruction in sex, which was only one aspect of it, could be given before the subject had any important psychological implications for the child. The desirability of avoiding conflict being the teaching of scripture and science was mentioned. A possible solution was the instruction of school chaplains in biology.

Professor T. G. B. Osborne also emphasized the necessity of beginning the teaching of biology early, so that sex instruction could fall into its natural place.

Dr. I. Clunies Ross, Dr. R. J. Tillyard, and Dr. Georgina Sweet also contributed to the discussion.

On the motion of Professor W. J. Dakin it was resolved:

> That the Executive of the Australian and New Zealand Association for the Advancement of Science impress upon the State authorities the urgent need for making provision for the teaching of elementary biology in school classes, and particularly in secondary schools.

The Adrenal Gland.

Dr. G. Bourne read a paper entitled "The Phylogeny of the Adrenal Gland". He said that in the platypus and echidna this gland was not as well organized as in mammals, but more like that in reptiles. In marsupials the gland was well developed, but in some the three cortical zones were not constantly present.

The adrenal gland appeared to be closely related in its development to that of the brain in mammals. It was suggested that as the development of his brain was the outstanding feature of man, the adrenals might have played an important part in man's evolution from his primate ancestors.

Anthropology in Australia.

In Section F the President, Professor A. P. Elkin, gave his address on "Anthropology in Australia, Past and Present". He said that anthropology in Australia until recently had been studied almost entirely by amateurs. Their work was not organized, but in spite of this some of them had made important contributions to knowledge. Many of them had the advantage of material and conditions no longer available. The outstanding figures among these earlier investigators were G. Strehlow and the surveyor, R. H. Matthews. The latter established the importance of local organization in the social life of aborigines and of kinship in marriage. The more specialized and scientific type of investigation commenced with the work of W. E. Roth.

With the foundation of the Chair of Anthropology in Sydney in 1926, and with the funds made available by the Rockefeller Foundation through the Australian National Research Council, organized research had been carried out in Australia and the neighbouring islands into physical anthropology, linguistics, and social anthropology. As a result a much better understanding now existed as to the organization and needs of the peoples studied. They might now hope for the development of a civil service in Australia, such as existed for work among the natives of Papua and New Guinea.

Cultural Status of Australian Aborigines.

Mr. N. B. Tindale read a paper entitled "Cultural Status of the Australian Aborigines". He discussed recent advances in the subdivision of Australian stone cultures and referred to their relation to European palæolithic cultures. Excavations at Devon Downs, South Australia, revealed four distinct periods of culture. Mr. Tindale stressed the importance of the historical point of view in studying Australian stone culture. He said that the distribution of stone axes emphasized the almost insuperable difficulty of attempting to apply the view that culture differences in Australia were controlled principally by availability of the raw materials and their quality.

Aboriginal Mentality.

Dr. H. K. Fry read a paper entitled: "Aboriginal Mentality". He said that one difficulty arising from the contact between whites and aborigines in Australia lay in the fact that the different types of whites concerned—police, missionaries, prospectors, station-owners—had no common standard of belief and action. The authority of the elders was undermined without being replaced by a definite system. Some contact with whites was inevitable, but if the enthusiasm of the whites for gold, land and theological and scholastic education could be restrained, there was a faint chance of the few remaining tribes living on and gradually adapting themselves to white civilization. Preservation of the authority of the old men was essential.

Medical Education of Papuans.

Medical education of the Papuan natives was discussed by Dr. W. M. Strong. Dr. Strong's paper will be published in a subsequent issue of this journal.

Australian Skulls.

Dr. G. Bourne and Mr. K. Mulcahy read a paper dealing with the craniometrical examination of Australian skulls in the Western Australian museums. They said that the cephalic index, cephalic height index, facial index, gnathic index, orbital index, nasal index and cranial capacity had been measured in thirty skulls. The results agreed closely with measurements of aborigines from other parts of Australia.

European Influence in Papua.

Mr. F. E. Williams read a paper concerning European influence on the natives of Papua. He said that the study of culture contact was important for two reasons: first, because it permitted of a dynamic study of culture, and, secondly, because it dealt directly with the main problems of anthropology as an applied science. He drew attention to certain general effects of European influence on the natives of Papua. First, from the sociological angle, the present situation was characterized as one of cultural incoordination. The fact of disintegration was recognized, but the former concept was held to be more useful than the latter to a practical anthropology, because it embraced the present, whereas disintegration had reference rather to the past.

In the second part of his paper Mr. Williams dealt with three general psychological results of the clash with a higher culture, namely, dulness, perplexity or mental confusion, and the sense of inferiority. In guiding and assisting the reintegration of native society, that was to say, the formation of a satisfactory blend of old and new materials, they should attempt to obviate these undesirable results. In reference to the last-named result, it was claimed that the native's sense of inferiority would reach serious proportions only if he was forced into conformity and competition with the whites. Further, under such a policy of Europeanization, he would have to contend with the antagonism of the whites. Mr. Williams said that the solution lay in leaving the native the right of cultural independence.

Mythology, Totemism and Religion in North-West Australia.

Mr. J. R. B. Love read a paper entitled "Mythology, Totemism and Religion of the Worora, North-West Australia". He said that, as the title of his paper indicated, the beliefs and practices of the Worora could be correlated under these three headings. Mythology was concerned with ancestor worship, *wungurus*, reproductive-essence-centres and recording of latter-day events of importance. The Worora concept of human birth and individual naming after a *wunguru* was set forth. The rock paintings were *wundjunas*, the first men, and of animals and of effects associated with the tribal totems. Their general purpose was to insure rain and the increase of food objects. The inter-marrying moieties, *adbulara* and *arwunaria*, and their relationship to the *wundjunas* were described in some detail. The travels and exploits of a particular *wundjuna*, Kulorubada (he having the dose), were also described. Totemism in the exogamous hordes was explained with the meaning of the descriptive terms and the related dreams. Mr. Love said that religion with the Worora was associated with the practice of sacred ceremonies of *kurangundam* by fully initiated men. The introduction of new forms of *churingas* (Arunta) *a sacra* (Worora name, *mawngarinja*) since contact with remote tribes was due to the advent of white men. Mr. Love also dealt with the psychic life of the Worora.

Censorship of Books in Australia.

At a meeting of Section G, under the presidency of Mr. J. B. Brigden, the present system for the censorship of books by the Commonwealth was condemned. It was said to be crude, unintelligent and lacking in discrimination. For the advancement of science free expression of opinion must be allowed.

The following resolution was unanimously adopted by the section:

> That since all books are subject to the laws concerning defamation, obscenity, and blasphemy, it is desirable that they should be admitted without censorship in Australia, and that as the first step towards this end no book on any historical, political, or economic subject that is freely circulated in Great Britain should be subject to censorship in Australia.

Medicine and the Social Plan.

Dr. J. V. Duhig, in his presidential address to Section I, discussed "The Place of Medicine in the Social Plan". It is hoped that this paper will be published in full in a subsequent issue.

Atmospheric Incidence of Pollen.

A joint discussion on the atmospheric incidence of pollen was held by Section I and Section M.

Miss M. Sharwood read a paper on the pollen content of Melbourne air during the hay fever seasons of August, 1933, and March, 1934. She said that tree pollen, particularly that of elm, was most plentiful during August and September. Grass pollen then became plentiful and was most prevalent towards the end of November and again at the end of March. The end of November was the worst part of the hay fever season. From October to January the pollen of various weeds, plantain, sorrel, dock and chenopodium, was plentiful in the air.

Rain caused pollen to be precipitated and decreased the air content. Northerly winds were associated with a high pollen content. A relation to the relative humidity had not yet been established.

Dr. C. Sutherland pointed out that patients sensitive to grass pollen suffered only from October to January. Those suffering earlier were sensitive to tree pollen. Those suffering in autumn were sensitive to various cultivated flower pollens. A survey of Australia to show the distribution of various grasses was needed. Hay fever patients suffered most on windy days. On still days they suffered soon after waking. Possibly the pollen settled during the night and became more concentrated in the lower layers of the air.

Virus Disease and Animal Reservoirs.

Dr. F. M. Burnet read a paper entitled "Animal Reservoirs in Relation to Virus Disease of Man in Australia". He discussed three diseases. He said that endemic typhus was usually contracted from rats, which formed the common reservoir. In at least one instance in Australia (Toowoomba, 1925) the human outbreak was associated with a mouse plague. Possibly the infection of the mice by the virus was the means by which the plague ended, the human infections being accidental results of the spread among mice.

Psittacosis in man was practically non-existent in Australia, but recent investigations had shown that an extraordinarily high percentage of parrots, both captive and wild, were infected with the virus. The possibility of human outbreaks must, therefore, be borne in mind.

The severe encephalitis, "X disease", occurring in sparsely populated parts of western New South Wales and adjacent States in the late summer months of 1917, 1918 and 1925 might have been derived from sheep with latent infection of the virus of louping ill, which was common among sheep in Scotland. The geographical distribution of cases made it almost certain than an animal reservoir was concerned in the epidemic, but the evidence of the identity of the virus with that of louping ill was circumstantial and incomplete.

These three diseases presented similar epidemiological problems. In each the animal host was as a rule mildly infected, an equilibrium being maintained between virus and host which insured the survival of both species. Under certain conditions, of which the only one clearly established was an increased population density of the animal host, the virulence of the virus increased and the equilibrium was temporarily upset. Increased virulence for the animal host was sometimes, but not always, associated with increased virulence for man.

Undulant Fever in Queensland.

Dr. J. V. Duhig read a paper entitled "Undulant Fever in Southern Queensland: A Survey of Two Areas of Enzootic Contagious Abortion". He said that in these areas the disease was enzootic in cattle on a large scale. Samples of blood for agglutination tests for two strains of *Brucella abortus* and *Brucella melitensis* were taken from 66 dairy farmers. Only two gave a significantly high

titre. It was evident that even close association with aborting cows did not involve much risk of the conveyance of infection to humans.

A close watch had also been kept for cases in private and hospital practice. Three cases had been observed in three years. One patient was a woman living on a farm with cattle heavily infected with brucella; the second was a milk carter from a mildly infected area; the third was a boy for whom no connexion with contagious abortion could be traced, but who consumed the ordinary ration of milk.

In view of the wide prevalence of contagious abortion in cattle, the low incidence of a corresponding human disease was satisfactory.

Hæmoglobin Content of Infants' Blood.

Dr. Hilda Kincaid read a paper entitled: "A Note upon the Hæmoglobin Content of the Blood of Infants and the Administration of Dried Milk containing an Added Salt of Iron". She said that in the high incidence of anæmia found among British infants the addition of 32·5 grains of iron ammonium citrate to each pound of dried milk was found to increase the morbidity rate and to increase the hæmoglobin content of the blood. Experience in Melbourne was that many infants were intolerant of such an addition of iron salt, as shown by vomiting, constipation or diarrhœa, or refusal to take enough food to supply energy requirements. Smaller quantities were tolerated, and even quantities of the order of one-hundredth of the above addition produced a satisfactory increase of hæmoglobin without dietetic disturbances.

The whole of nineteen untreated infants had a hæmoglobin content below 70% (Haldane). None of twenty-one treated infants had a hæmoglobin content below 70%. Many of the infants with low hæmoglobin content were of good colour and apparently in excellent health. A more exact knowledge of the normal range of the hæmoglobin content of the blood of infants and the minimal iron intake necessary to maintain this normal value was needed.

Malarial Therapy and Neurosyphilis.

Dr. C. D. Brothers, Dr. C. Farran-Ridge and Dr. S. Gunderson read a paper entitled "A Preliminary Note on the Influence of Malarial Therapy on the Serological Reactions of Cases of Neurosyphilis, with Special Reference to the Vernes Test". Of the patients treated at Mont Park, 43·5% had improved sufficiently to allow of their return home; many were able to resume their former occupations. The supreme importance of early diagnosis in syphilis of the nervous system was emphasized, both from the point of view of the patient and of the general public. It was suggested that persons such as signalmen, locomotive drivers *et cetera*, upon whom the lives of others habitually depended, should be examined medically at regular intervals, with the possibility of neurosyphilis in the examiner's mind.

Graphs were shown which demonstrated, by means of the Vernes test the striking effects of malarial treatment on the serological reacions of patients suffering from neurosyphilis.

Tuberculosis Today.

Dr. R. A. Southwood read a paper entitled "Tuberculosis Today". This paper is published in this issue at page 239.

Human Tuberculosis of Bovine Origin.

"Human Tuberculosis of Bovine Origin in Victoria" was the title of a paper by Dr. R. Webster. This paper will be published in a subsequent issue of this journal.

Dr. H. B. Ruddock read a paper entitled "Bovine Tuberculosis in Cattle". He said that the disease often could be detected only by the tuberculin test. At present there were no means of controlling tested milk or of checking that sold as tested. The number of animals tested in Victoria during the period 1931-1934 was an extremely small fraction of the total. No headway was being made and there was no chance of the disease being eradicated by present methods. The incidence increased as Melbourne was approached, but remote areas were by no means immune. The formation of a committee for eradication in Victoria was suggested.

In a discussion which followed, Dr. W. J. Penfold suggested that the solution of the problem lay in the immunization of the child population.

Dr. J. Dale disagreed. He considered that the only satisfactory solution of the problem lay in increasing the natural immunity of the affected population by improving their conditions of life. This meant raising their economic status.

Professor J. B. Cleland suggested that the economic loss involved in the slaughtering of infected animals might be avoided and protection to milk consumers afforded by preventing infective material from the cow from entering its milk.

Infectious Diseases in Melbourne.

Dr. F. V. Scholes read a paper entitled "The Behaviour of Infectious Diseases in Melbourne during the Past 25 Years". Dealing first with diphtheria, he said that the apparent increase during 1910-1922 as compared with 1890-1910 was due to: (*a*) notable increase of population, especially of children; (*b*) more accurate diagnosis; (*c*) deliberate search for signs of infection. The apparent decrease from 1922 onwards was due to: (*a*) earlier diagnosis and more efficient treatment; (*b*) shifting of relative age incidence from younger to older children and adults. The seasonal incidence and the effect of this on incidence in age and sex groups were discussed.

Scarlet fever, measles and whooping cough were similarly treated. The principal epidemics were discussed and the tendency for epidemics of the last two diseases to alternate was mentioned.

Professor Harvey Sutton emphasized the importance of Dr. Scholes's twenty-five years' experience at a hospital which dealt with four-fifths of all cases of diphtheria and scarlet fever, an adequate sampling of community experience.

The cyclical rise and fall of diphtheria was well shown by the rise of the diphtheria death rate even at a time when serum therapy had markedly reduced its fatality rate. While technical diphtheria cases might have swelled the numbers notified, this would not explain the increased death rates.

The study of measles and whooping cough was particularly interesting, as knowledge of the morbidity of these diseaess was limited, owing to lack of notification. The recurrent peak epidemics of measles, whooping cough *et cetera* should make the wary health officer cautious about the success or failure of any measure of health control until an adequately long experience was available.

Measles, with its two to three year period, might cause elation in the interval, and correspondingly unjustified depression in the peak year. Such facts should breed humility, the essential ingredient of truth.

Professor Sutton wished to know whether the New South Wales experience in regard to influenza had been paralleled in Victoria. During 1919, the influenza year, every other infectious disease common in childhood was at a minimum, as influenza had displaced the other infections. As influenza chiefly killed adults, the mortality in children from all infections reached its minimum that year for the ten-year period on either side. The years following, however, showed marked rises in certain diseases.

Another matter on which information was sought was the response, if any, of the incidence of diphtheria in sections of the metropolitan area where immunization was practised, as compared with other areas where little or nothing was done.

Dr. C. N. Atkins stated that of 300 patients with diphtheria admitted to the Infectious Diseases Hospital, Hobart, 56 suffered from what was not clinical diphtheria (18·6%) and 147 were "negative" (49%), while few (2·3%) had laryngeal types of the disease. How long should these patients be retained? Even after discharging patients only on "negatives", fresh patients were admitted from the same homes. Should these convalescents have their tonsils removed?

The death rate was 5·3% (16 deaths) and if moribund patients dying within twenty-four hours of admission to hospital were omitted, 4%. Occasionally carelessness on the part of the doctor had been noted when patients arrived after two full days with well marked diphtheria.

Dr. Atkins was particularly interested in the very fatal cases of vasomotor failure about the tenth day. One German worker suggested hot baths to combat a peripheral rather than a central failure in circulation.

One recovery had taken place after giving every form of treatment, a "broadside" of drugs.

A free clinic for diphtheria immunization was in operation in Hobart. In an institution of thirty boys who had been immunized, the matron returned after her holiday with a diphtheritic throat infection. Though in contact with the children for two or three days, no case occurred, though three boys became temporary carriers.

Dr. J. V. Duhig, the President, noted the very real difference between *gravis* and *mitis* types, and asked Dr. Scholes his experience in this direction.

Dr. Scholes, in reply, said that good results had occurred in country centres from diphtheria immunization. In metropolitan areas the keen medical officer of health tended to stimulate notification, and so in immunized areas notifications went up, with a low death rate; in inert areas notifications might be low, but the death rate is high. The exact relationship of *gravis* and *mitis* types to severe and mild clinical types was not yet clear. The recent rise of diphtheria probably depended on increased immigration with many young children. As an example of the need for guarded prognosis in health control he instanced the epidemic of eighteen months ago and the marked drop during the past six months. Had an extensive immunization campaign been instituted eighteen months ago what a success might have been claimed!

The lull in 1919, during the influenza year, was recorded in the graphs, while in 1920 measles and whooping cough had unusually large epidemics.

Dr. Scholes was in favour of the hospitalization of selected patients with whooping cough and measles, such as patients with complications requiring skilled nursing, cases in which medical assistance was absent, where the first of a family of young children was affected, or in conditions of neglect and poverty, and in institutions. On the other hand, the admission of patients with mild diphtheria and of patients with scarlet fever might well be curtailed. Danger of cross-infection in properly run modern hospital wards was negligible.

The high proportion of technical diphtheria in Hobart was not seen at Fairfield, where it did not exceed 15%. All technical cases were checked off and cancelled, so that they did not appear in the figures for notifications.

Length of stay or the routine swab as guides for discharge of patients had little effect on the return cases from diphtheria and scarlet fever. Patients with mild infections clearing up thoroughly could go early with safety. Children with severe attacks, persistence of glands enlarged, nasal irritation, tonsils enlarged or inflamed, would require further supervision, whether in hospital or by the general practitioner at home. Tonsils might be safely and easily removed by operation and hundreds of patients were operated on at Fairfield yearly.

The failure in the second or third week was not only peripheral and vasomotor, but often myocardial and adrenal. Treatment such as hot baths was thus of little avail. The early use of glucose, usually supplemented with insulin, gave the best hope.

Diabetes in Victoria.

Dr. E. Downie read a paper in which he surveyed the diabetic mortality in Victoria during the past twenty years. He referred to the great benefit to the health of diabetics resulting from the use of insulin. He said that attempts to discredit the value of insulin on the grounds of increasing mortality from diabetes since its discovery were not justified. The increase was restricted to middle-aged women, among whom the death rate was highest. Deaths among children and young adults had decreased considerably. In 1920-1923 30% of all deaths from diabetes occurred before the age of fifty. During 1930-1933 only 11% of these deaths occurred before this age. Diabetics in all age groups were being kept alive much longer than ever before.

In a comparison of Victorian figures with those for New South Wales it was seen that the mortality from diabetes before the use of insulin was much the same in the two States, but that during the last four years the figures for Victoria were much better. This was attributed to the effect of a State-wide scheme in Victoria for the education and treatment of diabetics. The figures were evidence that the scheme had been successful and that the diabetic position in Victoria now compared favourably with that in any other country.

Stillbirth and Neonatal Mortality.

Papers on stillbirth and neonatal mortality were presented by Dr. W. J. Penfold and Miss Hildred Butler from the point of view of infection occurring in the course of birth, and by Dr. J. V. Duhig and Dr. K. M. Wilson from the point of view of injuries to the child, especially to the head, during childbirth.

Suicide in Australia.

Dr. S. J. Minogue discussed the incidence of suicide in Australia. He said that in Australia, as in other civilized countries, the greater number of suicides occurred during the hot months of the year. The reason for this was not known. The suicide rate in Australia was low as compared with most other countries. The rate from 1868 to 1910 was 114·5 per million. Among the Australian States Tasmania had the lowest rate. The rate increased northward. Social conditions seemed to have little influence upon the rate, but some influence of the prevailing economic conditions could be seen. The average age of suicide was much lower for women than for men.

Physiological Effects of Hot, Dry Climates.

In his presidential address to Section N, Professor H. Whitridge Davies discussed some physiological effects of hot, dry climates. After describing some well authenticated instances of survival without water for several days in hot, dry climates, Professor Davies pointed out that no economy in the physiological use of water was possible, but that economy could be effected in avoiding conditions under which the water supplies of the body were wastefully dissipated. This could be done by avoiding the secretion of visible sweat. The central Australian aboriginal did this by avoiding all possible exertion during the heat of the day. He might also be better able to store water than the white. Before a long march he drank much water, a good deal of which was retained. The physiological unsoundness of drinking after or during the performance of strenuous exertion was pointed out. This led to an outburst of visible sweat, with a consequent wastage of salt and water from the body. Even when large quantities of water were lost by insensible perspiration, cramp did not occur, because the salt content of the body was conserved. The diaphoretic action of alcohol contra-indicated its use as a beverage in hot climates.

Hæmolysis by Australian Snake Venoms.

Mr. H. F. Holden read a paper entitled "Hæmolysis by Australian Snake Venoms". Hæmolysis of rabbit red cells was compared with hæmolysis by other agents. Small variations in pH caused considerable variations in the speed of the reaction. The reaction was delayed by many proteins, notably by serum albumin. Egg albumen had practically no effect. It was greatly accelerated by traces of calcium salts, by lecithin, and by unknown substances in rabbit corpuscles which were apparently of lipide nature. Sheep corpuscles, in the presence of sodium chloride, were not hæmolysed by the venom. They contained a lipide substance which greatly delayed the hæmolysis of rabbit corpuscles.

Water and the Energy Metabolism of Australians.

Dr. H. S. Halcro Wardlaw read a paper entitled "The Part Played by Water in the Energy Metabolism of Australians". He said that under basal conditions white Australians lost about 30% of their energy by evaporation, as against about 25% for north Americans. Australian aborigines lost about 36% of their basal energy in this way. The absolute rates of water loss per unit area of body surface were much the same for the different groups of subjects; the percentage differences were due to the different levels of their basal metabolism. Under conditions of exercise and high external temperatures aborigines lost water some 30% faster than whites. As a result they showed a much smaller rise of body temperature than whites under given conditions. In spite of their greater loss of water from the skin the blacks showed much smaller loss of water from their blood than whites under similar conditions. They were thus better adapted to hot, dry external conditions.

Phosphorus Deficiency.

A joint discussion of Section N with Section L on phosphorus deficiency was opened by Mr. W. L. Hindmarsh. He said that osteomalacia in cattle had been known in New South Wales for many years. Calcium deficiency in the fodder had been regarded as the most important causative factor, but lack of phosphorus was now known to be the principal factor. Some pastures known to be poor in calcium had carried heavy milking cattle for fifty years. The cattle were now developing the habit of bone chewing and it was assumed that the phosphorus was becoming depleted. Sheep as a rule were less affected than cattle, but in some areas of New South Wales matured late, showed diminished fertility, and fragility of bones, like cattle. Such sheep, however, produced a better quality of wool than normal. The most effective remedial measure was the addition of bone meal to the ration. The addition of phosphate manures to pastures was slow in effect and costly, but it must be begun early if their value to stock was to be preserved.

Mr. H. R. Marston pointed out that in South Australia sheep were rarely affected. Owing to their relatively lighter skeleton, the concentration of phosphorus in their bodies was only about half that in cattle. Further, the daily requirement of a sheep was only a small fraction of that of a cow. Again, sheep were selective feeders and were able to pick out the richer portions of the pasture in a way impossible to cattle. The results of phosphorus deficiency were not shown even on phosphorus-poor soil while grass was growing vigorously. Phosphorus deficiency in fodder caused anorexia and resulted in deficient protein intake and complicated the picture by accelerating the loss of phosphorus by starvation. To avoid fluorosis the $F : P_2O_5$ ratio of food must be below 1 : 40. The assimilation of phosphorus from cheap rock phosphate added to rations was as good as that from more costly phosphate. It should not be forgotten that bone meal contained a considerable proportion of protein.

Dr. A. W. Turner pointed out the danger which had arisen as a result of subdivision of large holdings in Queensland. It was now no longer possible for cattle to migrate from one area to another as changes of season demanded.

Professor W. A. Osborne pointed out that a new problem in animal nutrition had arisen with the development of vertebrates. Their bony skeleton demanded a richer source of calcium than the common calcium carbonate which sufficed for invertebrates. It was necessary for the body fluid to be saturated with calcium phosphate. If the saliva was not saturated, for example, the teeth went into solution.

Vitamin C.

The physiology and chemistry of vitamin *C* was discussed by Dr. G. Bourne and Mr. R. L. Allen. The history of the discovery of vitamin *C*, of its identification with ascorbic acid and of the elucidation of its chemical structure were discussed at length. The relatively high concentration in the adrenals, pituitary and *corpora lutea* were mentioned, and the possible necessity of vitamin *C* for the synthesis of adrenal extract was discussed. The possible association of *C* avitaminosis with a large number of diseases was mooted. It was suggested that the result of deficiency would depend on the individual and would be manifested at his weakest spot.

Physiology of the Renal Pelvis.

Dr. J. Leon Jona read a paper on the physiology of the kidney pelvis. He said that the calyces contracted in succession downwards at about two second intervals, a globule of urine being eventually passed into the ureter. The process was illustrated by a cinematograph film made up from a number of pyelograms taken with the pelvis of the kidney filled with a radio-opaque fluid. Graphic records were also obtained by means of a ureteric catheter. Antiperistalsis was commonly seen when the bladder was overfilled, even in apparently normal subjects. The possible protective function of this in preventing rupture of the bladder was discussed. The secretion of urine was inhibited when the ureteric pressure became equal to the secretion pressure. Such a mechanism was not possible in animals in which the ureter opened into the bladder behind a valve.

The Pituitary Gland and Carbohydrate Metabolism.

A joint discussion of Section N with Section I was held on the pituitary gland and carbohydrate metabolism.

Dr. B. Corkill said that until recently attention had been focused on the actions of posterior lobe extracts. The importance of the anterior lobe was now realized in its control of sexual development, growth and the utilization of carbohydrate.

In hypophysectomized animals the blood sugar fell below the normal level after a glucose meal; the effect of insulin was exaggerated. There was increase of carbohydrate and adrenaline tolerance. Removal of the pancreas in such animals caused only mild diabetes. In these animals also adrenaline did not relieve insulin hypoglycæmia. The pituitary was responsible for the formation of glucose from non-carbohydrate sources (protein). The posterior lobe and the *pars tuberalis* were without effect. The effect of the pituitary on fat metabolism was obscure and the results contradictory.

Dr. G. Bourne emphasized the importance of the relation of the pituitary to the adrenal medulla and of the production of an adrenotropic hormone by the pituitary.

Dr. Ivan Maxwell suggested that the adiposity due to failure of ovarian hormone might be secondary to failure of production of gonadotropic hormone (prolan) by the pituitary. He referred also to the relation of thyreoid hypofunction to fat metabolism and to the part played by the thyreotropic hormone of the pituitary and to the effect of lesions of the hypothalamic area.

Dr. E. Downie referred to the intimate relation between fat and carbohydrate metabolism. He said that the carbohydrate tolerance of normal persons could be made similar to that of diabetics by inducing a condition of ketosis.

Professor Harvey Sutton pointed out that the pituitary was certainly involved in the disturbed fat metabolism of Fröhlich's syndrome in children, as shown by the accompanying increased skeletal growth. The condition frequently disappeared as maturity was reached.

Dr. H. S. H. Wardlaw emphasized the importance of controlling the relative level of fat metabolism in considering the effect of any agent upon carbohydrate metabolism. The carbohydrate tolerance of a normal person could be materially depressed by a few days on a low carbohydrate/fat ratio in the diet, and sensitivity to insulin increased to such an extent that hypoglycæmia would result a few hours after ingesting glucose.

Professor W. J. Young inquired what relation the pituitary bore to the liver in its control of the production of carbohydrate from protein. The latter organ was usually regarded as having the predominant rôle in this.

Dr. B. Corkill, in reply, said that the formation of carbohydrate in the liver was controlled by insulin. The pituitary exercised its effect through its control of the action of insulin.

Transmission of Impulse in Nerve Endings.

In a paper on the transmission of the impulse at the endings of the parasympathetic and voluntary nerves Mr. F. H. Shaw said that Loewi first showed that a substance was produced on vagal stimulation of a frog's heart which entered the perfusate and could slow the beat of a second heart. The substance was shown by its action on the *rectus abdominis* preparation of the frog to be indistinguishable from acetylcholine. Its amount was too minute for chemical detection.

Later transmission of impulses across the synapse of the superior cervical ganglion was shown to be due to liberation of acetylcholine at the endings of the preganglionic fibre. Acetylcholine had been suggested as the substance responsible for the transference of voluntary impulses, but the evidence was conflicting.

Liberation of adrenaline from the medulla of the suprarenals on stimulation of the splanchnics was due to liberation of acetylcholine at the endings of these nerves.

Acetylcholine was rapidly destroyed by an enzyme present in tissues in blood. The action of stimulation of the parasympathetic nerves of one organ thus did not spread to other organs.

Physiological Standardization of Biological Products.

Dr. J. A. Broben read a paper entitled "Certain Aspects of Physiological Standardization of Biological Products". He said that owing to variation of test animals from time to time in different places and of different individuals, the creation of a fixed unit in terms of a given quantity of a stable standard substance was a prime requisite. Types of animal variation were discussed, with the principles of assay methods adopted to nullify such variation. The types of assay were broadly two: (i) Quantitative comparison of physiological response with the response produced in the same individual by the standard substance. (ii) The "quantal response" method. In this the reaction was of the all or nothing type. The respective reactions of the individual to standard and test substance could not be compared quantitatively.

The first type of test was illustrated by a description of the method used for the standardization of insulin in the Commonwealth Serum Laboratory. In Melbourne the average level of blood sugar for convulsions in rabbits was 35 milligrammes per 100 millilitres of blood, as against 45 for Toronto rabbits. The normal level of blood sugar was 98 milligrammes, as against the Toronto figure of 110. For a single test 18 rabbits were used. For one batch of insulin 150 rabbits were required, and on these 4,200 blood sugar determinations were performed.

Similar principles were involved in the standardization of pituitary extract. More than one active principle was involved, however, and tests must be considered in terms of each.

The Chick Embryo as a Subject for Experimental Work.

Dr. F. M. Burnet discussed the chick embryo as an experimental animal and made particular reference to work on virus diseases. He said that the respiratory membrane of the egg was exposed by cutting a window in the shell and reflecting the shell membrane. The respiratory membrane was allowed to sink by letting air out of the air sac. In a certain proportion of eggs non-specific reactions due to trauma occurred. They were easily distinguished from the specific reactions. Many filtrable viruses could multiply on this membrane and produce characteristic changes. The multiplication took place free from bacterial infection and, as the opening could be sealed, there was no possibility of accidental infection of other animals, which was a difficulty in the study of certain highly infectious animal diseases. The developing egg was thus a convenient and easily controlled experimental animal.

The chick embryo could also be used to supply large quantities of bacteria-free virus-containing material for immunization purposes. Vaccinia virus grew well on it, and egg virus which was initially free from bacteria might eventually replace calf lymph as the standard agent for vaccination against smallpox.

Mussel Poison.

Dr. C. H. Kellaway read a paper entitled "The Pharmacology of Mussel Poison". He said that the symptoms caused by this poison were largely nervous. They were disturbances of sensation, paralysis and finally death by failure of respiration. Ordinary methods of cooking did not destroy the poison, but cooking with sodium bicarbonate destroyed a large part of it.

Dr. Kellaway's experiments showed that the poison had a powerful effect on the nervous system. It had a direct effect on the respiratory centre and on the centre in the brain stem which controlled the reaction of the blood vessels throughout the body. The immediate effects were a profound fall of blood pressure and slowing and enfeeblement of respiratory movements. With larger doses there was failure of respiration.

Like curari and Australian snake venom, the poison also had a powerful paralysant action on motor nerve endings. Those in the diaphragm were peculiarly susceptible. The effect, like that of curari, was reversible. The poison was excreted in the urine.

Treatment involved attempts to get rid of the poison as rapidly as possible by emptying the alimentary canal and by stimulating the secretion of urine. The patient might be kept alive until out of danger by artificial respiration in the Drinker respirator.

The Histophysiology of the Adrenal Gland.

Dr. G. Bourne read a paper entitled "The Histophysiology of the Adrenal Gland and its Significance in Adrenal Function". He suggested that owing to his protection from cold and from grave "emergencies", civilized man made less demand upon the adrenal medulla for adrenaline than did primitive man. Consequently this organ might be expected to degenerate and become the analogue of the vermiform appendix. The possibility that the adrenal cortex might share in this degeneration, with consequent deficiency of cortical hormone and vitamin *C*, was discussed. The prevalence of allergic diseases amongst civilized people might be the result of their inability to adjust themselves to diminished adrenaline output.

In a discussion which followed, Dr. Ivan Maxwell pointed out that although civilized man might not be so often faced with emergencies as primitive man, he was subjected to a much greater continuous nervous tension, and that there was no basis for the author's supposition that his adrenaline requirement might be less.

The Action of Andrenaline and Ephedrine.

Dr. Ivan Maxwell read a paper entitled "The Action of Adrenaline and Ephedrine on the Respiratory and Circulatory Systems". He said that adrenaline was of great importance in the treatment of various allergic conditions met with in medical practice, including asthma. Recent work indicated that the injection of large doses of adrenaline might be a life-saving measure in persons manifesting very severe forms of allergy. Ephedrine was now available in pure form for treatment of allergic conditions.

In reply to a question, Dr. Maxwell said that there was no evidence that adrenaline, even when used over a period of years, had any permanent effect on the blood pressure. The effective dose might increase, however.

Determination of the Centre of Gravity of the Body.

A paper entitled "A New Method of Determining the Centre of Gravity of the Human Body" was presented by Professor W. A. Osborne and Mr. A. H. Faul. It was explained that in this method the subject lay upon a table suspended from gimbals. The centre of gravity of the apparatus without the subject was at the point of suspension. With the subject on it the table moved until the centre of gravity of the subject was vertically beneath the point of suspension, as indicated by a plumb-bob and an indicator moving over squared paper. The sensitivity of the apparatus was such that a movement of the centre of gravity of 0·05 millimetre could be detected. The apparatus was damped by vanes moving in water to prevent cardiac and respiratory movements from interfering with the measurements.

The Centre of Gravity of the Body and Venous Congestion.

A paper entitled "Quantitative Changes in the Centre of Gravity due to Venous Congestion of the Lower Limbs" was read by Dr. F. S. Cotton. The blood in a leg was dammed back by an inflatable cuff on the upper part of the thigh. In this way the lower limbs could be made to hold nearly one kilogram more blood than the normal amount, which was about one-fourth of the blood in the body. On release of the pressure in the cuff the original distribution of the blood was restored within half a minute. The rapidity of adjustment indicated that the alteration of volume of the limb was due to alteration of the volume of its capillary bed and that transudation of blood into the tissues played no significant part in the change.

Materia Medica of Inorganic, Synthetic Organic and Natural Organic Substances.

In Section O the President, Dr. R. Gardner, gave an address on "The Relative Positions in Materia Medica of Inorganic, Synthetic Organic and Natural Organic Substances". He said that inorganic chemistry, under the influence of recent advances in the knowledge of atomic structure, was making remarkable progress in directions not foreseen thirty years ago. The influence of this in medicine was at present difficult to assess.

New synthetic substances were still being made; of these a limited number would no doubt prove of value in medicine, but the lack of general relations between chemical and pharmacological properties must be emphasized.

Pure substances continued to be isolated from vegetable extracts. The use of substances formed in the various glands was characteristic of the present period and seemed to offer unlimited scope for discovery. No doubt all of these substances would ultimately be synthesized, but the synthetic product might not always replace the natural for economic reasons.

The Eucalypts.

A paper entitled "Physiological Forms of Eucalypts as Determined by the Chemical Composition of their Essential Oils and their Influence on Botanical Nomenclature" was read by Mr. A. R. Penfold. He said that the different forms could not be distinguished botanically, but had distinctly different chemical composition. It was imperative that botanists should name these as varieties A, B, C *et cetera* of the type species, so that their relationship should be obvious to non-botanists.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," pages xvi, xvii and xix.

AUSTIN HOSPITAL FOR CANCER AND CHRONIC DISEASES, HEIDELBERG, VICTORIA: Medical Officer.

CHILDREN'S HOSPITAL (INCORPORATED), PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officer.

LAUNCESTON PUBLIC HOSPITAL, LAUNCESTON, TASMANIA: Resident Medical Officers.

MOOROOPNA HOSPITAL, MOOROOPNA, VICTORIA: Junior Resident Medical Officer.

PUBLIC SERVICE BOARD, SYDNEY, NEW SOUTH WALES: Junior Resident Medical Officers.

RENWICK HOSPITAL FOR INFANTS, SYDNEY, NEW SOUTH WALES: Honorary Physician.

SAINT VINCENT'S HOSPITAL, MELBOURNE, VICTORIA: Honorary Officers.

THE AUCKLAND HOSPITAL BOARD, AUCKLAND, NEW ZEALAND: Radiologist.

THE UNIVERSITY OF MELBOURNE, VICTORIA: Lectures in Pathology, Demonstratorship in Histology.

UNIVERSITY OF CAMBRIDGE, CAMBRIDGE, ENGLAND: Diploma in Medical Radiology and Electrology.

VICTORIAN EYE AND EAR HOSPITAL, MELBOURNE, VICTORIA: Resident Surgeons, Post-Graduates.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associate Friendly Societies' Medical Institute. Chillagoe Hospital. Members accepting LODGE appointment and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	Officer of Health, District Council of Elliston. All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

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